# THE DECAPODA BRACHYURA OF THE SIBOGA EXPEDITION

I

## HYMENOSOMIDAE, RETROPLUMIDAE, OCYPODIDAE, GRAPSIDAE AND GECARCINIDAE

Siboga-Expeditie
XXXIX c

# THE DECAPODA BRACHYURA OF THE SIBOGA EXPEDITION

BY

Dr. J. J. TESCH
Leiden

I

## HYMENOSOMIDAE, RETROPLUMIDAE, OCYPODIDAE, GRAPSIDAE AND GECARCINIDAE

With 6 plates

LATE E. J. BRILL
PUBLISHERS AND PRINTERS
LEIDEN — 1918

# INTRODUCTION.

"In the vast extension .... which marine Zoology has for some time past been receiving, some retardation in the stream of discovery may not be unwelcome to the systematist. Familiar forms which would otherwise amply repay a thorough reinvestigation are apt to be thrust on one side, when striking novelties are for ever appealing to be introduced".
TH. R. R. STEBBING, Stalk-eyed Crustacea Malacostraca of the Scottish National Antarctic Expedition. Transact. Roy. Soc. Edinburg, v. 50, prt 2, n° 9, 1914, p. 253.

With Prof. WEBER's kind permission and the ready consent of Dr. IHLE I have been entrusted with the task of working up a part of the Brachygnathous Crustacea Decapoda of the "Siboga" Expedition. The present paper deals with 5 families: Hymenosomidae, Retroplumidae (= Ptenoplacidae), Ocypodidae, Grapsidae and Gecarcinidae, viz. the bulk of the large group commonly known as Catometopous Crabs.

The families enumerated yielded 68 species in all and only 4 of them are new to science. This fact may seem disappointing, in view of the large series of new forms, continuously appearing in almost every larger group of marine Evertebrata secured by the expedition, but is not to been wondered at. Firstly the Ocypodidae, Grapsidae and Gecarcinidae are, as is well-known, inhabitants of the beach, of mouths of rivers and brooks, and of the jungle near the shore, and the "Siboga", devoting most of her labour to deep-sea working, only occasionally collected terrestrial and fresh-water animals. And secondly the scarcity of new species may readily be explained by the very habits of the three families, the species of which are generally largely represented in such collections as are gathered by naturalists of tropical regions, who have no particular means at their disposal of investigating the deeper and more inaccessible regions of the sea; and collectors as BROCK, STORM, SEMPER, KÜKENTHAL a. o. have made us acquainted in more recent years with a rather large number of new species of the said families, so that the chance of discovering novelties in this regard is small.

In the present paper it are not the new forms which are laid stress upon, but rather it is a synopsis of all the known Indo-Pacific species, together with keys to genera and species, that is aimed at. ALCOCK's classical work "Materials for a Carcinological Fauna of India" and eventually n° 6 in: Journ. As. Soc. Bengal, v. 69, prt 2, 1900, only deals strictly with Indian (or rather British-Indian) species, and is only to a limited degree suited to any naturalist who attempts the determination of Catometopous crabs from the East-Indian Archipelago. The literature on the subject is so very much scattered, that a general review on the carcinological

# INTRODUCTION.

"In the vast extension.... which marine Zoology has for some time past been receiving, some retardation in the stream of discovery may not be unwelcome to the systematist. Familiar forms which would otherwise amply repay a thorough reinvestigation are apt to be thrust on one side, when striking novelties are for ever appealing to be introduced".
TH. R. R. STEBBING, Stalk-eyed Crustacea Malacostraca of the Scottish National Antarctic Expedition. Transact. Roy. Soc. Edinburg, v. 50, prt 2, n° 9, 1914, p. 253.

With Prof. WEBER's kind permission and the ready consent of Dr. IHLE I have been entrusted with the task of working up a part of the Brachygnathous Crustacea Decapoda of the "Siboga" Expedition. The present paper deals with 5 families: Hymenosomidae, Retroplumidae (= Ptenoplacidae), Ocypodidae, Grapsidae and Gecarcinidae, viz. the bulk of the large group commonly known as Catometopous Crabs.

The families enumerated yielded 68 species in all and only 4 of them are new to science. This fact may seem disappointing, in view of the large series of new forms, continuously appearing in almost every larger group of marine Evertebrata secured by the expedition, but is not to been wondered at. Firstly the Ocypodidae, Grapsidae and Gecarcinidae are, as is well-known, inhabitants of the beach, of mouths of rivers and brooks, and of the jungle near the shore, and the "Siboga", devoting most of her labour to deep-sea working, only occasionally collected terrestrial and fresh-water animals. And secondly the scarcity of new species may readily be explained by the very habits of the three families, the species of which are generally largely represented in such collections as are gathered by naturalists of tropical regions, who have no particular means at their disposal of investigating the deeper and more inaccessible regions of the sea; and collectors as BROCK, STORM, SEMPER, KÜKENTHAL a. o. have made us acquainted in more recent years with a rather large number of new species of the said families, so that the chance of discovering novelties in this regard is small.

In the present paper it are not the new forms which are laid stress upon, but rather it is a synopsis of all the known Indo-Pacific species, together with keys to genera and species, that is aimed at. ALCOCK's classical work "Materials for a Carcinological Fauna of India" and eventually n° 6 in: Journ. As. Soc. Bengal, v. 69, prt 2, 1900, only deals strictly with Indian (or rather British-Indian) species, and is only to a limited degree suited to any naturalist who attempts the determination of Catometopous crabs from the East-Indian Archipelago. The literature on the subject is so very much scattered, that a general review on the carcinological

fauna of the whole Indo-Pacific is urgently needed. Accordingly I have not restricted myself to the materials of the "Siboga", but also redescribed some obscure forms from other sources, from the Leyden and Amsterdam Museum, in order to render my work more complete, and I did not content myself to merely citing and recording, but also tried to make any species better known. Proceeding in this way it is astonishing what a multitude of perhaps small, but really important, facts may be detected in many so-called "known" species. Certainly (and I wish this to be clearly understood) this does not mean the slightest blame to my predecessors, not even to those who nowadays live only in old-fashioned books and, for some generations past, played their rôle in the general tragedy of mankind. For it are not only STEBBING's words here chosen as motto, but also those written by this venerable carcinologist on a former occasion, that I cannot refrain from citing, with the utmost approvement: "it can scarcely be regarded as a reproach to the earlier naturalists that they had not prophetic eyes to make them acquainted with the requirements of modern classification. We are perhaps industriously preparing equivalent stumbling-blocks for a future age, which possibly will only care to distinguish species by the internal structure as seen working in the living animal under the Röntgen rays. But for the difficulty of identifying forms described by our predecessors, we ought not to lay all the blame on the imperfection of the original accounts. It should be shared by the naturalists who sometimes in a long succession are content to quote the name of a species, without using the means at their disposal of making it thoroughly well-known. There is a sort of superstition that a new species is worth publishing, but that to deal with one to which some other person's name and some ancient date is attached, is a poor affair, stale and unprofitable". (On Crustaceans from the Falkland Islands. Proc. Zool. Soc. London, 1900, p. 518).

The "Siboga" material here dealt with is distributed over the families in the following way:

| | Species | New |
|---|---|---|
| Hymenosomidae . . . . | 2 | — |
| Retroplumidae . . . . . | 1 | 1 |
| Ocypodidae . . . . . | 18 | 2 |
| Grapsidae . . . . . | 43 | 1 |
| Gecarcinidae . . . . . | 4 | — |

I have to thank heartily my fellow-countryman Dr. J. G. DE MAN, who kindly and readily, in his usual way, assisted me by lending rare memoirs. The help of this excellent carcinologist has been the more appreciated by me, as international scientific intercourse nowadays is reduced to the extreme!

Leiden, July 4, 1917.

---

# HYMENOSOMIDAE.

Since the arguments put forth by ORTMANN [1]) and BORRADAILE [2]), it is now generally agreed, that the present family is to be classed with the Oxyrhyncha, and not with the Catometopous Crabs; indeed, the only character that may justify the latter view, viz. the sternal openings of the ♂ sexual organs, is counterbalanced by a whole series of features showing a close relationship to the Oxyrhyncha and especially to the Maiidae. It is remarkable, that DE HAAN [3]), as early as 1839, referred his species "*Ocypode (Elamene) unguiformis*" to the "Majacea"; in the atlas the species is called "*Inachus (Elamene) unguiformis*".

The Hymenosomidae are all littoral species; in the very rare instances, that they are found in the open sea, they seem to be clinging to some floating object. The majority of species inhabit the waters of New Zealand and the south and east coast of Australia; from here they radiate towards the Indian Ocean, to China and Japan, to New Caledonia and the west coast of South America, and to South Africa. One species is characteristic of sub-antarctic regions.

It is to be regretted, that most of the species are very insufficiently known, and it has been put forth by several authors, that a thorough revision, especially of the New Zealandian species, is much needed. Even the genera are not well defined, so that it has appeared advisable to some carcinologists to unite all the known forms into one single genus, *Hymenosoma*.

Under these circumstances it is a difficult and ungrateful task to undertake a systematic monograph of the present family. Nevertheless, with the scanty material of the "Siboga" added to some few, but interesting specimens of the Leyden and Amsterdam Museum [4]), I am of opinion that even the description of this small collection, the defining of genera and eventually of species, and the compilation of the literature, incomplete as this modest monograph appears, may be of some use to any one who chances to examine any members of the present family.

---

1) Zool. Jahrb., Syst., Bd 7, 1894, p. 31.

2) Fauna and Geogr. Maldive and Laccadive Arch., v. 2, 1903, prt 2. Marine Crust. X (Oxyrhyncha) p. 682 (note). — Ann. Mag. Nat. Hist. (7) v. 19, 1907, p. 480.

3) Fauna Japonica, dec. quarta, 1839, p. 75, pl. 29, f. 1.

4) Prof. WEBER has kindly allowed me to insert the descriptions of these specimens from the said Museums, for, though not caught by the "Siboga", they are Indo-Pacific as well.

The following key is proposed to distinguish the genera:

1. Epistome absent; ext. maxillipeds almost in contact with the bases of the antennules. Rostrum prominent, pointed, concave transversely. Dactyli of walking legs very long, styliform, not depressed, almost wholly straight and ending in an acute point, with two longitudinal rows of hairs and without spines at inner side . . . . . **Hymenosoma** Desmarest

   Epistome present. Dactyli of walking legs with spines at inner side . . . . . 2

2. Epistome rather long in longitudinal direction. Antennulae and antennae almost completely concealed beneath the rostrum; the latter projecting (as also the lateral borders of the carapace), triangular, truncate or tridentate. The ext. maxillipeds completely close the buccal cavern; merus shorter than ischium . . . . . 3

   Epistome short in longitudinal direction. Antennulae and antennae only at base concealed by the rostrum, that is triangular, trilobate or trispinose, but marked off posteriorly by a raised rim, that borders the flattened part of the carapace and is continued across the base of the rostrum. Ext. maxillipeds slightly gaping; merus somewhat longer than ischium. Sides of carapace with one or two (very rarely more) teeth at either side, but sometimes unarmed . . . . . 4

3. Rostrum elongate, triangular. Epistome very long, somewhat convex. Antennulae separated by a mere ridge . . . **Trigonoplax** H. Milne-Edwards

   Rostrum short, triangular, trilobate or truncate. Epistome shorter. Antennulae separated by a more or less prominent septum . . . . . **Elamena** H. Milne-Edwards

4. Rostrum consisting of three equidistant and equal, obtuse lobes, between the intervals of which the antennulae are visible. Sides of carapace with two teeth on either side. Walking legs rather robust, not much longer than breadth of carapace . . . . . **Halicarcinus** White

   Rostrum trilobate (the median lobe being inserted beneath the level of the lateral ones), triangular, truncate or trispinose. Sides of carapace unarmed or toothed. Walking legs mostly very slender, spider-like, elongate, but sometimes short and thickly hairy . . . . . 5

5. Walking legs very thin and slender, much elongate; dactyli falciform, of nearly equal breadth till near tip. Rostrum

prominent, differently shaped. Carapace subcircular, longer than broad. . . . . 6

Walking legs short, scarcely longer than breadth of carapace; dactyli straight, conical, gradually tapering to tip. Rostrum triangular, nearly vertically deflexed and fixed. Carapace transversely oval, broader than long; sides unarmed. Sides of carapace and legs covered by thick, club-shaped hairs, particularly long at sloping sides of the former, and on meropodites of legs. Very small species, breadth of carapace 5—6 mm. . . . . **Elamenopsis** A. Milne-Edwards

6. Rostrum trilobate, triangular or truncate . . . . . **Hymenicus** Dana

Rostrum trispinose . . . . . **Rhynchoplax** Stimpson

## **Hymenosoma** Desmarest.

1825. *Hymenosoma* Desmarest. Cons. s. l. Crust. p. 163.

Though this genus has been known since nearly a century, its true characters remained rather insufficiently indicated. H. Milne-Edwards [1]) first pointed out the absence of an epistome, but this important feature appears to have been overlooked by Haswell [2]), who advocated the view, that all the genera (at least *Hymenosoma*, *Hymenicus* and *Halicarcinus*) should be united into the original genus that gave its name to the whole group, which he called, however, *Hymenicinae*, following Dana. Haswell's opinion has been shared by Australian carcinologists, such as Baker [3]), Fulton and Grant [4]). Stebbing, however, recently [5]) argues, that *Hymenosoma* is distinguished, at least from *Halicarcinus*, by the much narrower shape of the merus and ischium of the external maxillipeds, and by the long hairs fringing the propodite and dactylus of the walking legs, which joints are spineless.

The absence of an epistome, the characters of the walking legs, and the narrow abdomen of the ♂, that reaches only to the middle of the nearly circular sternum, are all characters, that sharply separate at least the typical species of *Hymenosoma* from *Hymenicus* and *Halicarcinus*.

Though a rather large number of species has been assigned to *Hymenosoma*, only two species appear to have their proper place here; they may be distinguished thus:

Flattened part of carapace longer than broad (not including the rostrum); external orbital angle sharp, bifid and spine-like; walking legs rather short, about twice the breadth of the carapace. Abdomen of ♂ narrow, reaching up to the middle of the sternum. Species of South Africa. . . . . *H. orbiculare* Desmarest

1) Hist. nat. Crust., t. 2, 1837, p. 35—36. Ann. Sc. Nat. (3) t. 20, 1853, p. 222.
2) Cat. Austral. Crust., 1882, p. 114.
3) Transact. R. Soc. South Austr., Adelaide, v. 30, 1906, p. 114.
4) Proc. R. Soc. Victoria, v. 15, 1902, p. 59.
5) Transact. R. Soc. Edinburgh, v. 50, prt 2, 1914, p. 270.

Flattened part of carapace about as long (without rostrum) as broad, nearly circular; external orbital angle a low rim; walking legs long and slender, about 3 times the breadth of the carapace. Abdomen of ♂ short, triangular, "reaching only to the posterior margin of the sternum, corresponding to the fourth pair of legs" (CHILTON). Species of New Zealand *H. depressum* Jacquinot et Lucas

1. *Hymenosoma orbiculare* Desmarest. Pl. 1, Fig. 1.

For synonymy see STEBBING, Ann. S. A. Mus., v. 6, 1910, p. 331—332 and STEBBING, Transact. R. Soc. Edinburgh, v. 50, prt 2, 1914, p. 270.

The following records seem to have been overlooked by STEBBING:

H. MILNE-EDWARDS, Ann. Sc. Nat. (3) t. 20, 1853, p. 222, pl. 11, f. 2.
ORTMANN, Denkschr. d. med.-naturw. Gesellsch. Jena, Bd 8 (Semon's zool. Forschungsreisen, Bd 5, Lief. 1), 1894, p. 37.
LENZ, Abhandl. Senckenb. Gesellsch., Bd 25, 1905, p. 368.

This characteristic South African species was not represented in the "Siboga" collection, but I had the opportunity of studying a ♂ collected by Prof. WEBER in Table Bay near Cape Town, in 1894, 8—12 fathoms, sandy bottom.

I have figured this species again, for none of the figures heretofore published, at least as known to me, convey an exact idea of its outer appearance. The species has been figured in its details by STEBBING (l. c., 1914, pl. 25 A), but clear and exact as these drawings are, I hope not to do injustice to this highly-esteemed carcinologist in pretending that his figure of the habitus of the animal is really insufficient.

The flattened part of the carapace has a longitudinally-oval shape, semicircular posteriorly, somewhat pointed in its anterior part. It is bordered by minute tubercles at the sides and passes gradually into the rostrum, that is marked off behind its base by a feeble, convex rim. The rostrum itself is short, concave at its surface, somewhat deflexed, and pointed at the tip; at either side of the base there is a distinct callose thickening of the border. The eye-stalks are short and thick; the corneas reach beyond the tip of the rostrum. The sides of the carapace are obliquely-sloping outward, so that the total breadth of the carapace is equal to the length, not including the rostrum; these sloping sides are beset with numerous minute tubercles, and unite at the hind margin, between the bases of the hind legs, with the bordering rim of the flattened part; this rim, moreover, consists of two parts, separated off in the middle of its course; the posterior part passes very obliquely forward on the sloping sides of the carapace, thus marking off a hepatical and a branchial region. On the former region there are two obtuse prominences, that are themselves minutely tuberculate, the posterior directed upward, the anterior forward. The external orbital angles are situated beneath the level of the deflexed tip of the rostrum and reach as far forward as this tip; they are sharp, spine-like, and bifid; upper and lower margin of the orbit are practically absent, the orbit itself passing imperceptibly into the buccal cavern, as the epistome is wanting.

The regions of the carapace are defined by very regular grooves; the hexagonal cardiac area is separated by a deep cervical groove from the mesogastric region; the bulging gastric region is divided into two parts by a longitudinal line, and the anterior part is marked by numerous small but sharp granules. The branchial regions are crossed by several furrows, as shown in the figure; these regions are somewhat concave.

The short antennae arise from the outer wall of the open orbit, at the base of the superior fork of the external orbital angle; the basal joint is short and thick, immovable and fused with its surroundings, the second joint is free, slender, and about one and a half times the length of the next joint; the flagellum consists of three joints, diminishing rapidly in size, it does not reach as far forward as the antennulae, that are about 3 times the length of the rostrum. The peduncle of these antennulae consists of three joints of about equal length; the basal joint is by far the broadest, and the rostrum reaches to the middle of the second joint; the flagellum is short and thick (cf. STEBBING, l. c., 1914, pl. 25, A. f. *ai.*, *as.*).

The external maxillipeds (like also the anterior part of the sternum, between the bases of the chelipeds) are densely hairy, which renders it difficult, to make out their exact shape. They are somewhat converging anteriorly, leaving a triangular gap posteriorly; ischium and merus are of equal length, but both are somewhat broader in my specimen than is shown in STEBBING's figure (pl. 25 A. f. *mxp.* 3): the antero-internal angle of the ischium is more strongly bulging [1]) and the base of the merus more narrowed than in the figure quoted; the merus itself is about as long as broad at the distal end, which shows no trace of an auricle, and the carpus, that is broader than the next two joints, is inserted near the external angle of the merus. I have not examined the other maxillipeds in my single specimen; they are however figured by STEBBING (f. *mxp.* 2, *mxp.* 1).

The abdomen of the ♂ does not occupy all the space between the bases of the posterior legs; it is bottle-shaped; only the last 4 joints are free and not fused with the sternum and of these the penultimate segment is the shortest, the other being of about equal length. The tip of the abdomen occupies nearly the centre of the circular sternum and is separated by a wide, hairy space from the posterior margin of the buccal cavern.

STEBBING (1914, l. c. p. 270) describes the chelipeds of the ♂ as much more swollen than those of the ♀; I have not had an opportunity to study these legs in the latter sex, but in my ♂ specimen they are rather short and weak, about as long as the carapace; the meropodite is granular on outer surface, fringed with long hairs along the edges and without subdistal tooth at the upper border; the carpopodite and the palm are likewise granular at upper and outer surface; the internal angle of the former is not at all prominent; the palm is low, about as long as the fingers, fringed with long hairs along upper and lower border, smooth but pitted at inner surface; the fingers are straight, not particularly compressed, longitudinally grooved and of about the same height till quite near the curved and acute tip, the cutting margins are scarcely serrated in my specimen, but, according to STEBBING, the movable finger

1) In the figure of H. MILNE-EDWARDS (l. c.) this angle is represented as acutely pronounced, which does not agree with STEBBING's finds and mine. DE HAAN (Faun. Jap. pl. H) figures a very long merus, twice as long as the ischium; his specimen unfortunately is not extant.

"has a tooth on the inner margin which appears to vary considerably in its expansion and denticulation".

Of the walking legs the first and fourth pair are slightly shorter than the middle pairs; the meropodites are rather slender, their length being about three times the breadth and as long as the carpo- and propodite together; there are no spines whatever on the legs, but the upper surface is somewhat granular; the whole posterior margin is fringed with long hairs that are arranged in two longitudinal rows on the propodites and dactyli, and the superior row passes from the carpopodite gradually to the upper surface of the propodite; the dactyli are very long, straight, longer than the preceding joints and quite spineless along inner margins.

The specimen that has been in alcohol for more than twenty years has conserved a dark-yellow colour, finely mottled with dark spots, that are arranged in somewhat reticulated figures on the legs; the under side of the carapace and also the long hairs are of a lighter colour.

Dimensions in mm.:

| | | |
|---|---|---|
| Total length of carapace (including rostrum) | | 16.75 |
| Total breadth of carapace | | 17.5 |
| Breadth of flattened part of carapace | | 13.5 |
| Length | of penultimate segment of abdomen of ♂ | 1.5 |
| Breadth at base | of penultimate segment of abdomen of ♂ | 2.5 |
| Length | of last segment of abdomen of ♂ | 2.25 |
| Breadth at base | of last segment of abdomen of ♂ | 1.75 |
| Length of cheliped | | 17.— |
| Horizontal length of palm | | 4.5 |
| Length of mobile finger | | 4.5 |
| Length of meropodite | of penultimate pair of legs | 8.5 |
| Breadth of meropodite | of penultimate pair of legs | 2.5 |
| Length of carpo- and propodite | of penultimate pair of legs | 10.5 |
| Length of dactylus | of penultimate pair of legs | 8.— |

This species is quite characteristic of the South African littoral fauna, and has been caught nearly nowhere else [1]). Though apparently common in shallow waters near the shore it has been also dredged from a depth of 80 metres near Cape Agulhas [2]). The hairiness of the legs has induced some authors, rightly, I suppose, to ascribe a swimming faculty to the animal.

2. *Hymenosoma depressum* Jacquinot et Lucas.

The history of this species, that had been obscurely known, was traced ten years ago by CHILTON [3]), who gave a renewed description, accompanied by figures. Unfortunately we are not informed about the presence or absence of an epistome, nor about the shape of the external maxillipeds, but the hind margin of the walking legs is fringed with long hairs, and it is this very character that induced STEBBING [4]) to assume, that the species was placed in the right genus.

1) LENZ records a single specimen from Zanzibar.
2) DOFLEIN, Wiss. Erg. "Valdivia", Bd 6, Brachyura, 1904, p. 88.
3) Ann. Mag. Nat. Hist. (7) v. 19, 1907, p. 146—149. pl. 5.
4) Transact. R. Soc. Edinburg, v. 50, prt 2, 1914, p. 270.

The nearly circular flattened part of the carapace, the absence of a prominent external orbital angle, the short triangular abdomen of the ♂, and especially the very long and slender walking legs are sufficient characteristic features; the walking legs are, according to CHILTON, nearly three times the breadth of the carapace, and CALMAN [1]) adds that in specimens of the British Museum the legs are even more slender. The dactyli are, according to CHILTON's figures, distinctly shorter than the preceding joints, though in the text the reverse is stated.

The species inhabit the waters of New Zealand (Greymouth, Sumner, Auckland Islands, Akaroa Heads).

## **Halicarcinus** White.

For synonymy see STEBBING, Proc. Zool. Soc. London, 1900, p, 521.

STEBBING made a detailed bibliographical study of this genus, to which several most obscure species have been referred, most of which most probably enter into the synonymy of *H. planatus* (Fabricius). Both STEBBING and MIERS [2]) agree in accepting two species, that may be distinguished thus:

| | |
|---|---|
| Teeth of the tridentate rostrum placed wider apart; dactyli of walking legs narrowing gradually to apex, spines at inner border disposed in two indistinct, longitudinal rows. . . . . | *H. planatus* (Fabricius) |
| Teeth of the tridentate rostrum placed close together, touching each other at the base; dactyli of walking legs more slender, keeping the same breadth throughout their length till quite near apex, spines at inner border disposed in a single file. . . . . | *H. ovatus* Stimpson |

To which of these species the *H. pubescens* Dana [3]) is to be referred remains uncertain, and I have found no reference to it in more recent literature. It inhabits rather deep water (50 fathoms) at the east coast of Patagonia. Perhaps it is a new species, for the carapace is represented as nearly as broad as long, whereas it is distinctly broader in the two other species.

Some other species, viz. "*Hymenosoma*" *leachi* Guérin [4]), "*Hymenosoma*" *tridentatum* Jacquinot et Lucas [5]), "*Liriopea*" *leachi* Nicolet [6]) and "*Liriopea*" *lucasii* Nicolet [7]) are most incompletely known, and as any attempt to identify them is useless, they are better to be cancelled altogether. *Halicarcinus huttoni* Filhol [8]) seems to be identical with *H. planatus*, as far as can be judged.

1) In a note to CHILTON's article, l. c. p. 149.
2) Rep. "Challenger" Brachyura, 1886, p. 280—281.
3) Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 253. U. S. Expl. Exp., Crust., 1852, pl. 24, f. 8.
4) Voy. "Coquille", Crust., 1828, p. 22. Iconogr. Règn. an., Crust. pl. 10, f. 1.
5) Voy. "Astrolabe" Pôle Sud, t. 3, 1853, p. 60, pl. 5, f. 27. *Halicarcinus tridentatus* Filhol, Miss. île Campbell, t. 3, 1885, p. 396. FILHOL's description refers to *Hymenicus* rather than to *Halicarcinus*.
6) In Gay, Hist. d. Chile, t. 3, Zool., 1849, p. 160, pl. 1, f. 1.
7) L. c. p. 160.
8) L. c. p. 398, pl. 47, f. 1.

1. *Halicarcinus planatus* (Fabricius). Pl. 1, Fig. 2.

Literature: STEBBING, Proc. Zool. Soc. London, 1900, p. 524, pl. 36 B, and Transact. R. Soc. Edinburgh, v. 50 prt 2, 1914, p. 271.

In the collection of the Leiden Museum is an adult specimen (here figured), unfortunately without locality; besides I have examined 3 specimens, belonging to the Amsterdam Museum, collected by the late Dr. J. H. KRUIMEL at Port San Pedro (south of Valdivia, Chile) in April 1909. All these animals are females.

The drawing here given and the detailed account of STEBBING may, I hope, dispense me with a full description. Here I shall only remark the following facts:

1° The carapace is markedly transverse, broader than long; the side walls are obliquely-sloping down to the bases of the walking legs, but anteriorly they are perpendicular; there are two rather sharp but short teeth on either side of the side walls, placed beneath the bordering rim of the flattened part of the carapace and not attached to it. On the carapace there is one distinct groove, viz. the cervical one, and two short, radiating ones, parting from either end; the anterior is continued forward and marks off very feebly the gastric region; from this anterior groove two diverging lines on either side of the carapace are directed, one to the first, the other to the second lateral tooth. Here and there some minute granules are observed on the upper part of the carapace.

2° There is no rostrum proper, but beneath the anterior part of the rim, circumscribing the flattened part of the carapace, there are three exactly alike, obtuse, hairy teeth, the median being placed slightly above the level of the lateral ones; in the wide interspaces of these teeth the antennulae are largely projecting forward.

3° The eye-stalks are short and thick; the orbital margin is continuous, except for a scarcely prominent, obtuse external orbital angle; below the orbit is incompletely closed by the very thick basal joint of the antennae, that is fused with the surrounding parts immediately below the external orbital angle, and is somewhat produced at the antero-external angle. The antennae are short, reaching at most to the end of the penultimate peduncle-joint of the antennulae; the latter are not separated by a median septum at the base [1]), the basal joint is very short and thick, freely movable, and reaches as far as the teeth of the rostrum.

4° An epistome is present. The external maxillipeds are rather broad, not gaping (though not completely fitting together), covered with club-shaped hairs at outer surface and fringed with yellow hairs at inner margin; ischium broader than merus, but of equal length; carpus implanted at antero-external angle of the merus. These maxillipeds and other mouth-parts are figured accurately by STEBBING [2]).

5° Chelipeds (of ♀) rather weak, equal; palm swollen, length equal to that of fingers; the latter straight, finely serrated at inner margin; palm somewhat granular upward and somewhat hairy at outer surface. Ambulatory legs short, first pair being the longest (about twice the length of the carapace), diminishing in length posteriorly, nearly smooth, but which a very

1) STEBBING (l. c., 1900, p. 525) notes a median septum separating the antennules.
2) L. c. pl. 36 B.

short and thin pubescence; upper margin of meropodite ending in an obtuse prominence; dactyli compressed, as long as propodites, slightly tapering and feebly curved; the inner border provided with rather irregularly-placed teeth, rising among a continuous fringe of shorter or longer hairs and ending near the tip into two large diverging teeth. These dactyli have also been figured by STEBBING [1]).

Dimensions [2]) in mm. of Leiden Museum specimen:

| | |
|---|---|
| Length of carapace (including rostrum) | 9.5 |
| Length of median tooth of rostrum | 0.6 |
| Total breadth of carapace | 12.7 |
| Total breadth of flattened part of carapace | 11.3 |
| Length of cheliped | 13.2 |
| Length of first pair of walking legs | 18.5 |
| Length of fourth pair of walking legs | 15.8 |

This species is really characteristic of the subantarctic shores, whence it is recorded by numerous authors. MIERS [3]) observed that it is replaced by *H. ovatus* in the Australian waters, as far as could be traced out.

2. *Halicarcinus ovatus* Stimpson.

1858. *Halicarcinus ovatus* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, p. 109.
1876. *Halicarcinus ovatus* Miers. Cat. New Zealand Crust. p. 49.
1886. *Halicarcinus ovatus* Miers. Rep. "Challenger", Brachyura, p. 282.
1900. *Halicarcinus ovatus* Stebbing. Proc. Zool. Soc. London, p. 525, pl. 36A.
1907. *Halicarcinus ovatus* Stimpson, Smithson. Inst. Miscell. Coll., v. 49, p. 146.

Hab. Port Jackson, Port Philip, Jervis Bay.

## Hymenicus Dana.

1851. *Hymenicus* Dana. Amer. Journ. Sc. (2) v. 12, p. 290.
1852. *Hymenicus* Dana. U. S. Expl. Exp., Crust., p. 387.

The shape of the rostrum, that covers only the bases of the antennules, the rather long merus of the (slightly gaping) external maxillipeds, exceeding the ischium in length, and the slender walking legs make up the principal characters of this genus [4]).

ALCOCK [5]) considers *Rhynchoplax* Stimpson synonymous, but the rostrum is altogether differently shaped, and I have preferred to keep STIMPSON's genus erect, referring the two species of ALCOCK to *Rhynchoplax* and not to *Hymenicus*. In the former genus the rostrum consists of three spines, directed forward; in *Hymenicus*, however, it is broadly trilobate or triangular. Besides, *Hymenicus* is exclusively New Zealandian; *Rhynchoplax* inhabits the tropical shores of Asia, but two species are Australian.

1) L. c. pl. 36 B.
2) Measured under microscope.
3) Rep. "Challenger", Brachyura, 1886, p. 282.
4) DANA remarks in the diagnosis: "angulo extraorbitali nullo", but in reality the outer border of the orbit is sharp and slightly raised.
5) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 387.

To review the species of *Hymenicus* is very difficult to any one, who has no opportunity of examining the type specimens or a rich material from New Zealandian shores.

Considering the shape of the rostrum, two groups are to be distinguished:

I. Front triangular or slightly truncate:

*H. lacustris* (Chilton)
*H. haasti* Filhol
*H. edwardsi* Filhol
*H. pubescens* Dana
*H. australis* Haswell.

II. Front trilobate:

*H. varius* Dana
*H. novae-zealandiae* Dana
*H. cooki* Filhol
*H. marmoratus* Chilton.

1. *Hymenicus lacustris* (Chilton).

1882. *Elamena* (?) *lacustris* Chilton. Transact. Proc. N. Z. Inst., v. 14, p. 172.
1883. *Hymenosoma lacustre* Chilton. Transact. Proc. N. Z. Inst., v. 15, p. 69.
1902. *Hymenosoma lacustris* Fulton et Grant. Proc. R. Soc. Victoria, N. S. v. 15, p. 59, pl. 8.

This species is remarkable above all others by its inhabiting fresh waters. Judging from the figures of Fulton and Grant I think the species is to be placed in *Hymenicus* and not in *Hymenosoma*.

The lateral teeth of the carapace are absent in specimens from Norfolk Island; in those from Victoria the posterior teeth are wanting, and in specimens from New Zealand (Lake Pupuke, Auckland) the two pairs are both present, though obsolescent. The rounded, triangular rostrum, the bifid, prominent inner angle of the wrist, the finely-crenulate proximal part of the lower border of the palm, and the elongately-triangular abdomen of the ♂ seem to be the principal features of the species, but there are slight variations in specimens from different localities [1]).

2. *Hymenicus pubescens* Dana.

1851. *Hymenicus pubescens* Dana. Journ. Ac. Nat. Sc. Philadelphia, 1851, p. 254.
1852. *Hymenicus pubescens* Dana. U. S. Expl. Exp., Crust., p. 388, pl. 24, f. 11.
1853. *Elamene quoyi*? H. Milne-Edwards. Ann. Sc. Nat., (3) t. 20, p. 223, pl. 11, f. 3.
1865. *Hymenicus pubescens* Heller. Reise "Novara", Crust., p. 67.
1885. *Elamena quoyi*? Filhol. Miss. île Campbell, t. 3, prt 2, p. 403.

This species is very little known. I have united *Elamena quoyi* H. Milne-Edwards with it, though with a query; in comparing Dana's figure with that of Milne-Edwards the general appearance, and especially the shape of the rostrum, is unmistakebly the same; only the legs

1) In Mem. Austral. Mus., n° 2, 1889, p. 34 Whitelegge mentions a fresh-water species of *Hymenicus* found at Lord Howe Island. Though nothing more is known about this form it is likely to be referred to the present species.

are somewhat stouter and the dactyli broader and more falcate in the figure of the French author. That the latter referred his species to *Elamena* (which by the way is altered into *Elamene*) is no objection to my presumption, for there is much reason to believe, that MILNE-EDWARDS on the same page wrongly regarded a ♂ of *Halicarcinus tridentatus* as representing the type species *Elamena mathaei* Rüppell, and so confused the diagnosis of his own genus. Furthermore in the figure of *E. quoyi* the antennules are not covered by the rostrum and visible from above, the very character, that separates *Hymenicus* from *Elamena*.

Hab. New Zealand (Bay of Islands, Auckland and Cook Strait).

3. *Hymenicus haasti* Filhol.

1885. *Hymenicus* [1]) *haasti* Filhol. Miss. île Campbell, t. 3, prt 2, p. 402, pl. 47, f. 4.

In this species the carapace is broadly triangular, whereas in the preceding species it is nearly circular. The rostrum should be trilobate, the lateral lobes being exceedingly small, according to the text, but in the figure it is triangular and acutely pointed. Another discrepancy between text and figure is that in the former the carapace is stated to be 4.9 mm. long and 4.5 mm. broad, whereas in the figure (that is twice enlarged according to the explanation of plates [2])) these dimensions are much larger (16.5 and 15.5 mm. respectively. Carapace and legs are said to be covered with hairs; the ambulatory legs are stouter and shorter than in the preceding species.

Hab. Cook Strait.

4. *Hymenicus australis* (Haswell).

1882. *Hymenosoma australe* Haswell. Cat. Austral. Crust., p. 115, pl. 3, f. 2.

HASWELL, who does not care to distinguish between the different genera of the family (called by him Hymenicinae, notwithstanding his uniting all the genera in *Hymenosoma*), gives but little information about this species, nor is his figure of great use. Contrary to the two preceding species, the sides of the carapace are armed with two obscure teeth, the rostrum is triangular, prominent, somewhat truncate at extremity, and the hands of the ♂ are very high, with a rather sharp border below.

Hab. Williamstown, Port Philip (East Australia).

5. *Hymenicus edwardsi* Filhol. Pl. 1, Fig. 3.

1885. *Hymenicus edwardsi* Filhol. Miss. île Campbell, t. 3, prt 2, p. 400, pl. 48, f. 7.

A specimen of the Leiden Museum, from Auckland, s. n. *Halicarcinus tridentatus*, agrees

---

1) Except in this and another case the author persists in calling the genus *Hymeniscus*, but this error is corrected in the list of errata.

2) There are further discrepancies in FILHOL's paper between text and plates. Thus several figures are not at all referred to, neither in the text nor in the explanation of plates; *Halicarcinus tridentatus* is, according to this explanation, represented on pl. 50, f. 3, but in the text the figure is referred to *Hymenicus cooki*, and that *Elamena whitei* is figured on pl. 47, f. 2—3 is not mentioned in the text (p. 403).

in my opinion with FILHOL's species. As this is incompletely known, a fresh description and some figures may not be superfluous.

The carapace, as in all Hymenosomidae, is flattened and flexible above; the length, including the rostrum, equals the breadth. The rostrum itself is horizontal, broadly-triangular, but the anterior part is truncate, and in the middle of the anterior margin an obtuse prominence marks the tip of the rostrum; the borders of the latter are hairy, and posteriorly the rostrum is defined by a slightly raised rim, straight in the middle, but curved backward at either end, near the upper orbital margin (fig. 3*a*). The antero-lateral borders of the carapace are somewhat convex, and a very low prominence immediately below the bordering rim of the carapace represents the antero-lateral tooth; the posterior tooth is very acute, pointing forward, and placed below the border, midway between the external orbital margin and the posterior edge of the carapace. Behind the posterior teeth the margins of the carapace are a short way sub-parallel, then converging, and becoming even concave above the implantation of the last pair of legs, towards the posterior angle; the hind margin of the carapace is straight; $^1/_8$ of the total breadth of the latter. The cervical groove and the two short ones, radiating from either end, are distinct, but otherwise there is no indication of regions; the gastric and cardiac region are somewhat bulging, the hepatical and branchial areas concave; on the mesogastric regions there are two longitudinally-oval, tympana-like structures, each followed behind by a very small spot of the same kind, and with a faint longitudinal line between. The sloping parts of the carapace are nearly perpendicular, and everywhere, especially posteriorly and above the base of the legs, numerous club-shaped hairs are implanted, which on microscopical examination are feathered all round, save the short stalk.

The antennulae are much stouter and longer than the weak antennae; the basal joints of the former are short, though projecting beyond the rostrum; a very slight rim at the under surface of the rostrum separates them; the next joint is about twice as long, but only half as thick; the third joint again is as wide at the base as the preceding joint, but widening distally, and of the length of the basal joint. The antennae are implanted in the outer half of the infra-orbital border; the basal joint is directed obliquely-forward and inward, the two following joints being of the same length, directed straight forward, and gradually diminishing in thickness; the flagellum is very short and reaches at most as far as the second peduncle-joint of the antennules. The eye-stalks are short and thick; seen from above they are wholly exposed (fig. 3*a*); they are placed in shallow sockets, the borders of which are entire; the external orbital angle is a mere rim, sharp, but slightly raised.

The epistome is short, about three times as broad as long, the breadth being equal to the distance between the external orbital angles. The buccal cavity is nearly quadrate, its side margins only slightly diverging backward; from the anterior angle a sharp rim runs backward on the pterygostomial region, disappearing at the base of the anterior walking legs, and most projecting in the middle of its course.

The external maxillipeds are gaping; measured along the outer margin the merus is longer than the ischium and constricted at the base; the inner margin of both joints is fringed with long hairs; the ischium has a broad inner lobe, as is usual in the family, and is about as

broad as the merus; the carpus is inserted near the antero-external angle of the latter. The exognath is wholly exposed in normal position, it does not reach exactly as far forward as the merus.

The sternum is nearly circular, very much vaulted longitudinally, especially posteriorly, and concave in transverse direction; the grooves between the segments do not reach the cavity, in which the abdomen of the ♂ fits. The latter occupies the whole space between the bases of the last pair of legs; the first two segments are apparently fused and fixed, the next is very short, and the abdomen reaches its greatest breadth at the union of the 4th and 5th segment; from here it gradually tapers forward, but enlarges again, though very slightly, near the base of the terminal segment, which is as long as broad at the base and longer than all other segments, the tip is much rounded (fig. 3*c*) and reaches to the level of the base of the chelipeds.

The chelipeds of the ♂ are very robust, thick and scarcely shorter than the anterior walking legs, viz. $1^2/_3$ times the length of the carapace. Immediately anterior to the base a thick patch of hairs is observed, which hairs are of the same structure as noted above; similar hairs are scattered all over the chelipeds themselves, and the palms are wholly invested with such hairs, both inside and outside, so that they are looking like little muffs (fig. 3). The meropodite is without sharp borders, spineless, and widening distally; the wrist is rather large, with numerous transverse rugosities above, a patch of hairs in the middle of the under surface, and the inner angle not at all produced; the palm is much inflated (though the soft fur makes it look still thicker and higher), not quite as high as long, about as long as the fingers and quite smooth, as far as could be made out without removing the covering; the borders are rounded, not sharp. The fingers are straight, gaping at the base, finely serrated in the proximal half of the inner margin, and more coarsely so in the distal half, where the serrations fit closely together.

The ambulatory legs are slender and rather long, the penultimate pair being the longest (not quite twice the length of the carapace) and the last pair the shortest; this hind pair is implanted somewhat higher up. At the base, viz. at the margins of the basipodite, especially dorsally, and at the upper margin of the carpopodite, we observe the same curious, club-shaped, feathered hairs as are mentioned above; the meropodite is slender, cylindrical, about 5 times as long as broad, without spines or teeth, but with a tuft of hairs at the distal end, and sparsely beset with feathered hairs, that also occur on the two next joints; the carpo- and propodite together are slightly longer than the meropodite; the dactyli are long, slender, falciform, slightly shorter than the preceding joint, very gradually tapering, so that the breadth near the base only slightly exceeds that near the tip, the tip is acute and curved, and the inner margin of the dactylus is provided, like that of *Halicarcinus*, with a continuous row of denticles, between which are scattered somewhat longer hairs; the two terminal denticles, near the tip of the dactylus, are by far the largest and pointing in different directions.

I have little doubt that the specimen here described belongs to *Hymenicus edwardsi*, but nevertheless it must be noted, that Filhol mentions two sharp teeth at either side of the carapace and that the rostrum is called trilobate (the lateral lobes being most inconspicuous) in the text, though the figure corresponds quite well with the one here given. The general shape

of the carapace as shown in the figure of FILHOL, and the fur on the sides, the legs and especially on the palms of the chelipeds are features in common between FILHOL's specimen and mine.

Dimensions [1]) in mm.:

| | |
|---|---|
| Length of flattened part of carapace (including rostrum) | 8.75 |
| Breadth of flattened part of carapace | 8.5 |
| Posterior margin of penultimate segment of abdomen | 1.8 |
| Length of penultimate segment of abdomen | 0.6 |
| Posterior margin of terminal segment of abdomen | 1.1 |
| Length of terminal segment of abdomen | 1.2 |
| Horizontal length of chela | 7.1 |
| Height of palm | 3.5 |
| Length of mobile finger | 4.2 |
| Length of first pair of walking legs | 13.7 |
| Length of penultimate pair of walking legs | 14.9 |
| Length of meropodite of penultimate pair of walking legs | 4.2 |
| Breadth of meropodite of penultimate pair of walking legs | 0.8 |
| Length of propodite of penultimate pair of walking legs | 3.9 |
| Length of dactylus of penultimate pair of walking legs | 3.6 |

FILHOL obtained this species along the coast of the South Island (New Zealand), from Cook Strait to Stewart Island. My specimen came from Auckland (North Island).

6. *Hymenicus varius* Dana.

1851. *Hymenicus varius* Dana. Journ. Ac. Nat. Sc. Philadelphia, 1851, p. 253.
1852. *Hymenicus varius* Dana. U. S. Expl. Exp., Crust., p. 387, pl. 24, f. 9—10.
1865. *Hymenicus varius* Heller. Reise "Novara", Crust., p. 67.
1876. *Hymenicus varius* Miers. Cat. New Zealand Crust., p. 50.
1882. *Hymenosoma varium* Haswell. Cat. Austral. Crust., p. 115.
1885. *Hymenicus varius* Filhol. Miss. île Campbell, t. 3, prt 2, p. 399.

Hab. New Zealand (Bay of Islands, Auckland). North coast of Tasmania. Australia (Port Stephens, Port Jackson, Port Western).

7. *Hymenicus novae-zealandiae* Dana.

1851. *Hymenicus novae-zealandiae* Dana. Journ. Ac. Nat. Sc. Philadelphia, 1851, p. 254.

DANA himself was inclined to regard this species as a variety of the preceding and in his subsequent great work on the Crustacea of WILKES' Expedition it seems indeed to be united with *H. varius*.

Hab. New Zealand (Bay of Islands).

8. *Hymenicus cooki* Filhol.

1885. *Hymenicus cooki* Filhol. Miss. île Campbell, t. 3, p. 401, pl. 50, f. 3 [2]).

Hab. New Zealand (Cook Strait).

1) Measured under the microscope.

2) As has been noted above (p. 13 note 2), in the explanation of plates of FILHOL's work the figure is said to represent *Halicarcinus tridentatus* (Jacquinot et Lucas). This discrepancy renders both these species all the more obscure.

9. *Hymenicus marmoratus* Chilton.

1881. *Hymenicus marmoratus* Chilton. Transact. Proc. N. Z. Inst., v. 14, p. 172, pl. 8, f. 1 (2d and 3d maxilliped, abdomen).

It is to be regretted that Chilton does not give ample information about this species, said to be common in Lyttelton Harbour (New Zealand). It is closely allied to *H. varius*, but differs in having the carapace subtriangular, not circular, the two pairs of teeth at the antero-lateral margins being conspicuous, not obsolescent.

## Rhynchoplax Stimpson.

1858. *Rhynchoplax* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 109.
1900. *Hymenicus* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 387.
1907. *Rhynchoplax* Stimpson. Smithson. Inst., Miscell. Coll. vol. 49, p. 147.

The sharp three-spined rostrum distinguishes this genus in my opinion sufficiently from *Hymenicus*, to which it was united by Alcock. *Rhynchoplax* is apparently essentially tropical, but at the south-east coast of Australia the genera may occur together.

The following may serve to distinguish the 7 species, referred by me to the present genus:

1. Rostrum consisting of only one long spine between the eyes, and at either side of the base with an obscure tooth; eye-stalks long, reaching as far as the much prominent external orbital angle; penultimate peduncle-joint of the antennules reaching as far as rostrum; antero-lateral margin of carapace with 3 teeth at either side. Wrist of cheliped with 3 short, elevated, longitudinal carinae; palm acute above and below . . . . . *R. rostrata* (Haswell)

Rostrum consisting of three spines between the eyes. Wrist of cheliped without ridges . . . . . 2

2. No teeth (at most a faint prominence) at antero-lateral sides of carapace; median spine of rostrum somewhat longer than lateral ones 3

Lateral sides of carapace with one or more pairs of teeth . . . 4

3. Length of carapace (including rostrum) equal to breadth; walking legs about twice the breadth of the carapace . . . . . *R. krefftii* (Hess)

Length of carapace (including rostrum) much exceeding breadth; walking legs longer than 3 times the breadth of the carapace; median spine of rostrum $^1/_8$ the length of the rest of the carapace. Meropodite of cheliped with a subdistal tooth at outer border . *R. inachoides* (Alcock)

4. Antero-lateral margins of carapace with more than one pair of teeth. Meropodite of cheliped toothed at distal end of outer or upper border . . . . . 5

Antero-lateral margins of carapace with only one pair of teeth; rostrum consisting of a long median and two short lateral spines. Meropodite of cheliped unarmed . . . . . *R. coralicola* Rathbun

5. Median tooth of rostrum slender, styliform . . . . . 6
   Median tooth of rostrum flattened, spatuliform, about $^1/_3$ the length of the rest of the carapace. Meropodite of cheliped with 4—5 teeth at upper border, carpopodite with 4—5 blunt teeth at upper surface, inner side of palm at base of fingers thickly clothed with hairs. Each joint of ambulatory legs with two teeth at anterior or outer margin, one in the middle, the other near distal end . . . . *R. messor* Stimpson
6. Carapace ovate, with two teeth at either side (the anterior scarcely prominent, the posterior sharp); median tooth of rostrum setose. Meropodite of cheliped with one subdistal tooth (at outer border?) *R. setirostris* Stimpson
   Carapace subcircular (without rostrum), with three teeth, all prominent (the posterior, above the base of the cheliped, being the largest) at either side. Meropodite of cheliped with 4 blunt tubercles at upper border and a sharp subdistal tooth at outer border. Chelipeds in ♂ long and bulky, covered with fine hairs . . . . . *R. wood-masoni* Alcock

1. *Rhynchoplax messor* Stimpson.

1858. *Rhynchoplax messor* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 109.
1907. *Rhynchoplax messor* Stimpson. Smithson. Inst., Miscell. Coll. v. 49, p. 148.

Hab. Simoda (Japan).

2. *Rhynchoplax setirostris* Stimpson.

1858. *Rhynchoplax setirostris* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 109.
1907. *Rhynchoplax setirostris* Stimpson. Smithson. Inst., Miscell. Coll. v. 49, p. 148.

Hab. Hongkong.

3. *Rhynchoplax krefftii* (Hess).

1865. *Hymenicus krefftii* Hess. Arch. Naturgesch., Jahrg. 31. 1, p. 141, pl. 6, f. 5.
1882. *Hymenosoma krefftii* Haswell. Cat. Austral. Crust., p. 115.
1887. *Hymenicus krefftii* de Man. Zool. Jahrb. Syst., Bd 2, p. 695.

Hab. Sydney.

4. *Rhynchoplax rostrata* (Haswell).

1882. *Hymenosoma rostratum* Haswell. Cat. Austral. Crust., p. 116.
1906. *Hymenosoma rostratum* Baker. Transact. Proc. R. Soc. South Australia, Adelaide, v. 30, p. 114, pl. 3, f. 2.

Hab. Victoria.

5. *Rhynchoplax wood-masoni* (Alcock).

1900. *Hymenicus wood-masoni* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 388.
1902. *Hymenicus wood-masoni* Alcock. Ill. Zool. "Investigator", Crust. prt 10, pl. 64, f. 3.

Hab. Port Blair (Andamans), Port Canning (near Calcutta).

6. *Rhynchoplax inachoides* (Alcock).

1900. *Hymenicus inachoides* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 388.
1902. *Hymenicus inachoides* Alcock. Ill. Zool. "Investigator", Crust. prt 10, pl. 65, f. 1.

Hab. Port Canning (near Calcutta).

7. *Rhynchoplax coralicola* Rathbun.

1909. *Rhynchoplax coralicola* Rathbun. Proc. Biol. Soc. Washington, v. 22, p. 108.
1910. *Rhynchoplax coralicola* Rathbun. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n$^0$ 4, p. 316, f. 5.

Hab. Singapore.

## Elamena H. Milne-Edwards.

1837. *Elamena* H. Milne-Edwards. Hist. nat. Crust., t. 2, p. 33.
1853. *Elamene*? H. Milne-Edwards. Ann. Sc. Nat., (3) t. 20, p. 223.

The French author included in his genus only one species, *E. mathaei* (Desmarest), but in 1853 he seems to have mistaken a ♂ of *Halicarcinus planatus* (Fabricius) for the former species [1]), besides including at the same time two species in the genus, that are very imperfectly known, but apparently not to be placed here. So there is some confusion about the right interpretation of Milne-Edwards' diagnosis, but we must consider his first description of 1837 reliable. According to this account *Elamena* is characterized by the much flattened and lamellar carapace, by the broad, triangular rostrum, beneath which the antennules and the antennae are hidden; the antennules are separated by a vertical septum [2]); the orbits are scarcely indicated; the epistome is distinct and long; the merus of the external maxillipeds is quadrate, cut obliquely anteriorly and shorter than the ischium. A good diagnosis of the genus is provided by Alcock [3]). Usually, if not always, the distal end of the mero- and carpopodite of the walking legs is produced upward.

In the following I have attempted to distinguish between the species [4]) of the genus:

1. Front trilobate, the lobules of about equal length and obtuse, widely separated . . . . . 2
   Front shortly triangular or truncate . . . . . 3
2. Palm of cheliped much swollen, apparently as long as fingers. Median lobe of rostrum placed below the level of the lateral lobes. Corneae of eyes visible from above . . . . . *E. minuta* A. Milne-Edwards
   Palm of cheliped not much swollen, longer than fingers. Lobes of rostrum not horizontal, but pointing obliquely upward.

1) See Haswell, Cat. Austral. Crust., 1882, p. 114, and Stebbing, Proc. Zool. Soc. London, 1900, p. 520—521.
2) This character seems to be wanting in some species.
3) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 385.
4) I have excluded the following species: *E. quoyi* H. Milne-Edwards (Ann. Sc. Nat. (3) t. 20, 1853, p. 223, pl. 11, f. 3) which, as noted above, is likely to be identical with *Hymenicus pubescens* Dana; *E. mexicana* H. Milne-Edwards (Ibid., p. 224), characterized in a few words by the author and not only doubtful by its imperfect diagnosis but also by its pretended habitat (coast of Mexico); and finally *E. lacustris* Chilton, which in my opinion is a *Hymenicus* (see p. 12).

| | | |
|---|---|---|
| | A sharp tooth on sloping sides of carapace, on branchial regions; another tooth on pterygostomial regions, on either side of buccal cavern. Eyes, like antennae and antennulae, completely hidden beneath the front . . . . . | *E. filholi* de Man |
| 3. | Front truncate. . . . . | *E. truncata* A. Milne-Edwards |
| | Front shortly triangular . . . . . | 4 |
| 4. | Front somewhat deflexed; borders of carapace and legs wholly beset with numerous stiff hairs, much resembling spines, but flexible on the legs. . . . . | *E. pilosa* A. Milne-Edwards |
| | Front horizontal, lamellar; legs naked or sparsely hairy. . | 5 |
| 5. | Carapace narrowed into a "neck" anteriorly, upper part of carapace and all the legs more or less hairy . . . . | 6 |
| | Antero-lateral parts of carapace not forming a "neck", carapace and legs wholly hairless (save the dactyli of the latter) | 7 |
| 6. | Carapace somewhat angular, neck very long; rostrum considerably projecting beyond the eyes, not excavated at upper surface . . . . . | *E. longirostris* Filhol |
| | Carapace rounded, neck shorter; rostrum scarcely projecting beyond the eyes, leaving the eye-stalks exposed from above, strongly excavated at upper surface . . . . . | *E. whitei* Miers |
| 7. | Carapace rounded, not angular, broadly piriform; front very broad between the eyes. . . . . | *E. sindensis* Alcock. |
| | Carapace more or less angular . . . . . | 8 |
| 8. | Posterior lateral sides of carapace and posterior border nearly straight or slightly concave, meeting at distinct angles . | 9 |
| | Posterior lateral sides of carapace and posterior border forming together a semicircle. . . . . | 10 |
| 9. | Carapace pentagonal, anterior part triangular, antero-lateral prominence scarcely indicated, posterior angle (above base of cheliped) pronounced. . . . . | *E. gracilis* Borradaile |
| | Carapace heptagonal, owing to the antero-lateral angle being prominent; sides concave between the posterior and anterior angle [1]), and between the latter and the base of the rostrum . . . . . | *E. kirki* Filhol |
| 10. | Carapace with one pair of angles; rostrum small, little prominent . . . . . | *E. mathaei* (Desmarest) |
| | Carapace with two pairs of much prominent angles; rostrum broad, much prominent . . . . . | *E. producta* Kirk |

1) Filhol (Miss. île Campbell, t. 3, 1885, p. 405) calls these sides convex, and mentions this character as a difference between his species and *E. producta* Kirk, but in his figure (pl. 47, f. 6) the reverse is shown. Besides, in the explanation of plates, another specimen (♀) is referred to the present species (pl. 47, f. 8), though only the anterior angle of the carapace is indicated.

The little information given by authors as FILHOL and KIRK renders the separation of the species very uncertain in some cases, and the difficulty is increased by the great variation, not only in the shape of the chelipeds, but also in that of the carapace, between the two sexes of the same species, and even between members of the same sex.

1. *Elamena mathaei* (Desmarest).

1825. *Hymenosoma mathaei* (Latreille M.S.) Desmarest. Cons. s. l. Crust., prt 10, p. 163.
1830. *Hymenosoma mathei* Rüppell. Beschr. u. Abb. 24 Arten kurzschw. Krabben p. 21, pl. 5, f. 1.
1837. *Elamena mathaei* H. Milne-Edwards. Hist. nat. Crust., t. 2, p. 35.
(nec *Elamene mathaei* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 20, 1853, p. 223, pl. 11, f. 4, which is probably *Halicarcinus planatus* (Fabricius)).
1849. *Elamene mathaei* Krauss. Südafrik. Crust., p. 51.
1862. *Elamene mathaei* Heller. Beitr. z. Crustaceenfauna d. rothen Meeres, p. 371 [1]).
1875. *Elamene mathaei* Paulson. Rech. s. l. Crust. Mer Rouge, p. 71, pl. 9, f. 3—3*b* [1]).
1906. *Elamena mathaei* Nobili. Ann. Sc. Nat. (9) t. 4, p. 319.

Several authors (see p. 19 of the present paper) have alluded to the discrepancy between MILNE-EDWARDS' description of 1837 and his figure of 1853. I have had no opportunity of examining this species, the type of the genus, neither could I consult the figures of RÜPPELL [2]) and of PAULSON.

It is recorded from the Red Sea and from Mauritius.

2. *Elamena minuta* A. Milne-Edwards.

1873. *Elamene minuta* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 324, pl. 18, f. 5.

Hab. New Caledonia.

3. *Elamena pilosa* A. Milne-Edwards.

1873. *Elamene pilosa* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 322, pl. 18, f. 6.

This aberrant species is remarkable not only by its large size, but especially by the spine-bordered carapace and legs; shorter spines or rather stiff hairs are distributed on the upper surface of the carapace, on the pterygostomial regions, and on the much projecting extra-orbital angle. The rostrum is different from that commonly met with in this genus, by being thick, not lamellar, somewhat deflexed; the eye-stalks are wholly exposed, seen from above; the antennules reach largely beyond the rostrum, when extended, and are not separated by a prominent septum at the base. The merus of the external maxillipeds is somewhat longer than the ischium. All these characters warrant the creation of at least a subgenus, but I am loth to do so. At any rate the species is best recognizable among all the species of *Elamena*.

The Leiden Museum contains two specimens (both ♂), co-types of MILNE-EDWARDS, from

1) Cited after NOBILI.
2) RÜPPELL's paper is at my disposal, but unfortunately the plates 4 and 5 are missing.

New Caledonia, whence it has been recorded by the French author. As the latter figured all the details accurately, it is needless to enter into a fresh description. According to MILNE-EDWARDS the species grows to a very large size (breadth of carapace 26 mm., total breadth of animal across expanded legs 116 mm.); my specimens were considerably smaller.

4. *Elamena truncata* (Stimpson). Pl. 1, Fig. 4.

1858. *Trigonoplax truncata* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 109.
1873. *Elamene truncata* [1]) A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 323.
1893. *Elamene truncata* Henderson. Transact. Linn. Soc. London (2) v. 5, p. 395.
1900. *Elamene truncata* Borradaile. Proc. Zool. Soc. London, 1900, p. 575.
1900. *Elamena truncata* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 386.
1905. *Elamene truncata* Lenz. Abhandl. Senckenb. Gesellsch., Bd 27, p. 367, pl. 48, f. 15—15*a*.
1906. *Elamene truncata* Baker. Transact. Proc. R. Soc. South Australia, v. 30, p. 112, pl. 2, f. 2.
1906. *Elamena truncata* Laurie. Rep. Pearl Oyster Fish. Ceylon, prt 5, p. 428.
1907. *Trigonoplax truncata* Stimpson. Smithson. Inst., Miscell. Coll. v. 49, p. 146.

Stat. 172. Gisser, east of Ceram. On coral reef. 2 egg-bearing ♀.
Stat. 181. Ambon. On coral reef. 2 ♂, 2 egg-bearing ♀.

LENZ mentions the variation of the carapace, even among individuals of the same sex. In my specimens, the 4 ♀ have the carapace more distinctly angular than the ♂, especially in the case of the ♀ from Gisser (cf. fig. 4 and 4*b*); the posterior angle is here prominent and hooked, the anterior at least indicated. Besides, the walking legs of the ♀ are much shorter, scarcely $1^1/_2$ times the breadth of the carapace; in the ♂ they are more than twice this breadth. Only the smallest ♀ from Ambon has the legs relatively as much elongate as the ♂ and the dactyli are as long, and nearly straight, as in the latter sex. Thirdly, the corneae of the eyes project beyond the carapace in the ♂, but are not visible from above in the other sex.

The truncation of the carapace is different and apparently independent from the sex. Both LENZ and LAURIE allude to this, and the former has figured the difference in his two specimens. The anterior border may be either somewhat produced in the middle, or quite straight, or even slightly concave, and both angles may be prominent; yet in all cases there is no doubt about its truncation.

The carapace is very thin, lamellar, with scarcely any indication of regions, smooth and naked; the border projects as a sharp rim horizontally. The antennae, the second peduncle-joint of which is the longest, arise beneath the eye-stalks and are not much shorter than the antennules, that are folded up beneath the lamellar front and separated by a very marked, thick and high septum, extending forward up to the anterior border of the rostrum (fig. 4*a*). Epistome short, though distinct, deeply sunk. There are no proper orbits, but the eye leans against a very small postocular tooth, the existence of which is denied by ALCOCK. On the pterygostomial regions is a very prominent, waved, sharp

1) MILNE-EDWARDS described it as a new species, apparently in ignorance of STIMPSON's diagnosis; it is remarkable, that he chose the same specific name as his predecessor. Most subsequent authors regard MILNE-EDWARDS as the original describer.

rim, obliquely running from the anterior angle of the quadrate buccal cavern to the base of the cheliped; this rim is cut into three lobules, the anterior of which, near the angle of the buccal cavern, being the smallest, and the next the largest; the inferior part of the pterygostomial region, like the rim itself, and the upper surface of the external maxillipeds are beset with short hairs. The external maxillipeds completely close the buccal cavern; the merus is roughly triangular, shorter than the ischium, with the carpus inserted near the antero-external angle; the exognath is wholly exposed [1]), reaching nearly as far as the merus.

The abdomen of the ♂ is broadly triangular, reaching forward nearly to the anterior margin of the sternum, the penultimate segment is somewhat shorter than the two preceding segments and the terminal segment; the latter is triangular, about as long as broad at the base, and with the tip rounded.

The chelipeds of the ♂ are much longer than those of the ♀ and twice the length of the carapace; the meropodite is slender, widening distally, rounded, and the upper border is somewhat produced above the carpal joint; the palm is much swollen, quite smooth and hairless, about $1^1/_2$ times the length of the fingers; the latter are straight, acute at apex, not gaping, with the inner margins finely serrated and a quadrangular tooth quite near the base of the mobile finger. In the ♀ the whole cheliped is shorter and weaker; the fingers are much longer, nearly equalling the length of the palm, finely serrated at inner margin and without larger tooth; the tips are slightly spooned, and this difference between the two sexes seems to be characteristic of the genus.

The ambulatory legs of the ♂ are very slender and elongate, the second pair, which is the longest, being $2^1/_2$ times the length of the carapace, smooth and hairless, except the dactyli; the anterior margin of the mero- and carpopodite is produced distally, and the long, falcate, slightly curved dactyli are nearly as long as the preceding joints; the inner margin of the dactyli is hairy all along and near the tip are two diverging denticles. In the ♀ (save in the smallest specimen) the legs are much shorter, the dactyli are broader, more strongly curved, especially so in the case of the posterior legs [2]), but armed in the same way (fig. 4*c*).

It is remarkable, that all the ♀, though the largest is twice as broad as the smallest, are egg-bearing.

Dimensions in mm.:

| | 1 ♂ | 2 ♀ | 3 ♀ |
|---|---|---|---|
| Length of carapace | 5.75 | 6.75 | 4.25 |
| Breadth of carapace | 6.75 | 8.75 | 5.25 |
| Length of cheliped | 9.5 | 7.5 | 7.— |
| Length of palm | 3.5 | 1.75 | 1.5 |
| Length of mobile finger | 2.25 | 1.75 | 1.5 |
| Length of penultimate pair of legs | 18.— | 12.— | 11.5 |

N° 1 and 3 are from Ambon, n° 2 is from Gisser (east of Ceram).

1) Alcock (l.c. p. 385) says that this exognath is completely hidden both in the genera *Elamena* and *Trigonoplax*.

2) Whether these dactyli are also more curved in the ♂ I could not make out, as in both my ♂ specimens the posterior pair of legs is wanting.

The species is widely distributed throughout the Indo-Pacific region and seems to be the commonest of all the species of *Elamena*. It was found at Ousima (Japan), at the Loo-Choo Islands, New Caledonia, Rotuma (Pacific), Nicobars, Ceylon, Zanzibar, and even at the coast of South Australia. It has now proved to inhabit also the East Indian Archipelago.

5. *Elamena filholi* de Man.

1888. *Elamene filholi* de Man. Arch. Naturgesch., Jahrg. 53, 1. p. 386, pl. 17, f. 3.

Hab. Noordwachter Island near Batavia.

6. *Elamena sindensis* Alcock.

1900. *Elamena sindensis* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 386.
1902. *Elamena sindensis* Alcock. Ill. Zool. "Investigator", Crust. prt 10, pl. 64, f. 4.

Hab. Karachi (British India).

7. *Elamena gracilis* Borradaile.

1903. *Elamena gracilis* Borradaile. Fauna and Geogr. Maldive and Laccadive Arch., v. 2, prt 2 (Mar. Crust. prt X), p. 684, f. 122.
1911. *Elamena gracilis* Rathbun. Transact. Linn. Soc. London (2) v. 14, p. 242.

Hab. Indian Ocean: Minikoi and Hulule (Male Atoll), on reef; Coetivy.

8. *Elamena producta* Kirk.

1878. *Elamena producta* Kirk. Transact. Proc. N. Z. Inst., v. 11, p. 395 (with textfig.).
1885. *Elamena producta* Filhol. Miss. île Campbell, t. 3, prt 2, p. 404, pl. 50, f. 1—2 (mere reproduction of KIRK's description and figures).

Hab. Wellington (New Zealand).

9. *Elamena kirki* Filhol.

1885. *Elamena kirki* Filhol. Miss. île Campbell, t. 3, prt 2, p. 405, pl. 47, f. 6.

Hab. Port Chalmers, South Island (New Zealand).

10. *Elamena longirostris* Filhol.

1885. *Elamena longirostris* Filhol. Miss. île Campbell, t. 3, prt 2, p. 403, pl. 46, f. 7.
1916. *Elamena longirostris* Borradaile. Brit. Antarctic ("Terra Nova") Expedition, 1910, Zool., v. 3, prt 2, p. 101.

Hab. East coast of Stewart Island, near South Island (New Zealand), and planctonic (probably clinging to some floating object) at 34° 15′ S., 172° 0′ E.

11. *Elamena whitei* Miers.

1846. *Halicarcinus depressus* White. Ann. Mag. Nat. Hist., (1) v. 18, p. 178. (Nec *Hymenosoma depressum* Jacquinot et Lucas).

1876. *Elamene whitei* Miers. Cat. Crust. New Zealand, p. 52, pl. 1, f. 4.
1876. *Elamene whitei* Miers. Ann. Mag. Nat. Hist. (4) v. 17, p. 221.
1885. *Elamena whitei* Filhol. Miss. île Campbell, t. 3, prt 2, p. 403, pl. 47, f. 2—3.

Hab. East coast of Stewart Island, near South Island (New Zealand).

## Trigonoplax H. Milne-Edwards.

1853. *Trigonoplax* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 20, p. 224. (Nec *Trigonoplax* Stimpson, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 109, and Smithson. Inst., Miscell. Coll. v. 49, 1907, p. 146 (= *Elamena*).)

The pentagonal carapace, with the postero-lateral margins very short, and the long antero-lateral margins straight or concave and passing anteriorly into the triangular rostrum, the very long, bulging epistome and the absence of a septum between the antennulae are the characteristic features of the genus. Alcock [1]) regards it as merely a subgenus of *Elamena*.

There is only one species known, with a subspecies in Australian waters. The two forms are to be distinguished thus:

Length of carapace exceeding breadth, front short; dactyli of walking legs falcate, broadest at base . *T. unguiformis* (de Haan)
Length of carapace equal to breadth, front more elongate; dactyli of walking legs broadest at middle *T. ung.* subsp. *longirostris* Mc Culloch

### 1. *Trigonoplax unguiformis* (de Haan).

1839. *Ocypode (Elamene) unguiformis* de Haan. Faun. Japon. Crust. p. 75, pl. 29, f. 1 and pl. H (s. n. *Inachus (Elamene) unguiformis*).
1853. *Trigonoplax unguiformis* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 20, p. 224.
1893. *Elamene unguiformis* Henderson. Transact. Linn. Soc. London (2) v. 5, p. 394.
1894. *Trigonoplax unguiformis* Ortman. Zool. Jahrb. Syst., Bd 7, p. 31.
1900. *Elamena (Trigonoplax) unguiformis* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 387.
1900. *Elamene unguiformis* Lanchester. Proc. Zool. Soc. London, 1900, p. 761.
1902. *Trigonoplax sp.* de Man. Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, p. 500.
1907. *Trigonoplax unguiformis* de Man. Transact. Linn. Soc. London (2) v. 9, prt 11, p. 396.

In the Leiden Museum I found 7 of the original specimens of de Haan, dried and in a very bad state. As de Man's specimen (1902) did not wholly agree with de Haan's and Alcock's statements, and the former author was somewhat doubtful about the identity, the following remarks may be of use:

1° The dividing line between merus and ischium of the external maxillipeds is angular in de Haan's figure (pl. H), straight in de Man's specimen. In the original specimens it is indeed straight, only in one or two cases with a faint angulation.

2° The shape of the rostrum on pl. H of de Haan corresponds better with the facts than that of pl. 29: it is somewhat more rounded off and agrees with the rostrum of de Man's specimen.

1) Journ. As. Soc. Bengal, v. 69, prt. 2, 1900, p. 386.

3° The terminal segment of the abdomen of the ♂ is indeed rounded (DE MAN), not truncate (DE HAAN, pl. 29).

4° The fingers of the cheliped are in both sexes somewhat shorter than the palm (DE MAN), but not half the length of the latter (DE HAAN, pl. 29). They are spooned at the tip.

5° In the length of the walking legs there is much variation between the specimens: in one large ♀ (breadth of carapace about 17 mm.) the walking legs of the first and second pair are only twice the breadth of the carapace, and the legs are rather robust; in another ♀ (breadth of carapace 13.5 mm.) they are $2^1/_2$ times this breadth and more slender, which agrees with DE HAAN's figure (pl. 29). In a small ♂ (breadth of carapace 9 mm.) the penultimate pair (first and second pair wanting) is 3 times the breadth and $4^1/_2$ times the length of the carapace (including rostrum); the last legs are only slightly shorter. Judging from this we should conclude, that in the ♂ the legs are relatively longer and more slender than in the ♀, but DE MAN found legs with this "male" character in a young ♀, and, as this author presumes, it is perhaps better to regard this relative length of the legs as dependent of age.

6° As DE HAAN (pl. 29) and ALCOCK stated, the meropodites of the legs end at the upper border in a small prominence. In DE MAN's specimen this prominence is very large, about half as long as the next carpopodite. This character may suggest, that DE MAN's specimen is indeed a subspecies, but we cannot regard it as such, as long as only one single specimen is available.

The chief habitat of the species seems to be Japan, but it has also been found at the Andamans, in the Gulf of Martaban, at Singapore and Ternate.

2. *Trigonoplax unguiformis* subsp. *longirostris* Mc Culloch.

1906. *Elamena (Trigonoplax) unguiformis* Fulton and Grant. Proc. R. Soc. Victoria, v. 19, p. 10 (with textfig.).

1908. *Trigonoplax unguiformis* var. *longirostris* Mc Culloch. Rec. Austral. Mus. v. 7, p. 59, pl. 12, f. 3.

Hab. Port Philip (Victoria).

## Elamenopsis A. Milne-Edwards.

1873. *Elamenopsis* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 324.

This genus was regarded by MILNE-EDWARDS as a transition between *Pinnoteres* and *Elamena* and, though we know that the Hymenosomidae have nothing to do with the Pinnoteridae, the general appearance of *Elamenopsis* with its short legs doubtless resembles that of *Pinnoteres*. Only one species is known.

1. *Elamenopsis lineata* A. Milne-Edwards. Pl. 1, Fig. 5.

1873. *Elamenopsis lineatus* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 324, pl. 18, f. 4.

Stat. 127. Great Sangir Island (between Menado and Mindanao). On reef. 1 ♂.

This aberrant species discovered by A. MILNE-EDWARDS has been never found again since 1873.

The carapace is perfectly flattened, transversely oval, broader than long, with the sides regularly convex and unarmed; the posterior margin is straight; the anterior margin faintly convex, but beyond the latter the carapace slopes obliquely-forward and ends in a short and broad, triangular, obtuse rostrum, not visible in a dorsal view of the carapace, as it is nearly perpendicularly deflexed. The regions are defined by narrow but distinct sulci, the course of which in my specimen nearly corresponds with the figure of MILNE-EDWARDS: gastric and cardiac regions are distinct, and the bordering sulci as well as the deep cervical groove are situated in somewhat sunk and concave parts of the carapace, hepatical and branchial regions are also indicated, and the latter area is again divided by a transverse bifurcating sulcus in my specimen, parting from the end of the cervical groove, but simple and originating somewhat more anteriorly in MILNE-EDWARDS' figure. The lateral parts of the carapace are nearly perpendicular. The whole carapace, also the sternum, save the abdomen, is covered by a close, but very short, fur of a dark-brown colour; the hairs are somewhat longer at the sides and here club-shaped; a group of such hairs is placed immediately anterior to the bases of the chelipeds. The sternum is straight or somewhat concave transversely, but much convex, especially posteriorly, in a longitudinal direction. The abdomen of the ♂ is broadly triangular, but not occupying all the space between the posterior pair of legs; the third segment is very short, almost linear; the next segment the broadest of all, with convex lateral margins, much longer laterally than in the median line, as the anterior margin is curved rather abruptly backward in the middle (fig. 5*c*); the fifth segment is shorter than the next or penultimate segment, which is the longest, and twice as long as the very short, broadly triangular terminal joint, that is rounded at the tip. The general shape of the abdomen and the small last joint have been perfectly recognized by MILNE-EDWARDS. This terminal joint reaches forward to the level of a line connecting the posterior part of the bases of the chelipeds, but there is a rather great distance between the tip of the abdomen and the posterior margin of the buccal cavity.

The short eye-stalks are placed in shallow sockets, but there is no projecting external orbital angle; the antennae arise below the eye-stalks, and the peduncle reaches only as far forward as the eye; the antennulae are much stouter, with the basal joints close together and partly overlapped by the somewhat projecting lateral parts of the rostrum, the two next peduncle-joints of equal length, longer than the basal joint, and bent rectangularly to each other.

The epistome is distinct, projecting in the median line both anteriorly and posteriorly. Pterygostomial regions not longitudinally grooved or crested. Buccal cavern with the lateral borders slightly diverging backward. External maxillipeds gaping, especially posteriorly, hairy at outer surface, and closely fringed at inner margins; ischium somewhat shorter than merus, narrowing towards the base; both merus and ischium longer than broad, the latter not auriculated anteriorly; palp very thick, but long, inserted near antero-internal angle of merus; exognath partly concealed in normal position, slender, reaching nearly to anterior margin of merus (fig. 5*b*).

The chelipeds and walking legs are remarkably stout and shortened,

and wholly covered (save the fingers of the chelipeds) with a dense fur of similar hairs as are found on the lateral sides of the carapace. All the legs are only $1^1/_2$ times the breadth of the carapace, with exception of the posterior pair, that is somewhat shorter than the preceding pairs. The short meropodite of the chelipeds is three-faced, with rather sharp borders, but wholly unarmed; the wrist has a rounded inner angle; the palm is much inflated, smooth, with the horizontal length exceeding the height and also longer than the fingers; the latter are of a white colour, with the greater part naked, but provided with some ordinary, slender hairs, gaping at base and meeting at tip, which is acute, not spooned; the fixed finger has a very small tooth quite near the base of the inner margin and beyond this some minute serrations; the mobile finger is serrated in the same way, very high at the base, but tapering to tip, and the inner margin has a quadrangular tooth at about $^1/_3$ of the distance between the base of the inner margin to the tip of the finger (fig. 5*a*).

The stout walking legs differ little in length, only the last pair is distinctly shorter than the preceding pairs and about $1^1/_3$ times the breadth of the carapace, the penultimate pair measuring $1^1/_2$ times this breadth. They are wholly covered with hairs, even to the tip of the dactyli, that are straight, pointed and longest in the case of the second pair of ambulatory legs, where they equal the preceding joint in length. All the joints are completely unarmed; the meropodites are 3 times as long as broad, somewhat narrowing distally.

Dimensions in mm.:

| | | |
|---|---|---|
| Length of carapace (seen from above and not including the rostrum) | | 2.8 |
| Breadth of carapace | | 3.3 |
| Length of carapace | | 4.9 |
| Length of meropodite | of penultimate pair of legs | 1.9 |
| Breadth of meropodite | | 0.6 |
| Length of propodite | | 1.0 |
| Breadth of propodite in the middle | | 0.4 |
| Length of dactylus | | 0.8 |
| Length of posterior pair of legs | | 4.5 |
| Horizontal length of chela | | 2.1 |
| Height of palm | | 1.0 |
| Length of mobile finger | | 0.9 |

The original habitat of this species is New Caledonia, in brackish water. The "Siboga"-Expedition found it on the coral reefs, at Sangir, north of Celebes.

Species incertae sedis:

*Hymenosoma gaudichaudii* Guérin. Voy. "Coquille", 1828, pl. 2, f. 12, and H. MILNE-EDWARDS, Ann. Sc. Nat. (3) t. 20, 1853, p. 222.

*Hymenosoma laeve* Targioni-Tozzetti. Viag. "Magenta", Crost., 1877, p. 177, pl. 11, f. 3.

# RETROPLUMIDAE.

This family was instituted by GILL [1]) to receive the genus *Archaeoplax*, established by ALCOCK and ANDERSON [2]) in the previous year for an aberrant deep sea Crab. Becoming aware that this name *Archaeoplax* was praeoccupied, the latter authors changed the name into *Ptenoplax* [3]), but already GILL had changed the generic name into *Retropluma*, and accordingly the term Retroplumidae has priority above Ptenoplacidae. Nevertheless, such competent authors as BORRADAILE [4]) retain ALCOCK's nomenclature, and so does MAC GILCHRIST [5]). Only DOFLEIN [6]), in describing a new species, has followed GILL.

As to the generic affinities, ample information has been given by ALCOCK (l. c. 1899) and BORRADAILE. Only a single genus is known, the species of which inhabit the deeper parts of the sublittoral zone and may be called almost abyssal.

## Retropluma Gill.

Literature: DOFLEIN l. c. ALCOCK has excellently characterized this genus (l. c. 1899). Two species have been described, but the "Siboga" Expedition has yielded a third one.

1. Side margins of carapace with only one tooth (or rather angulation) behind ext. orb. angle. Rostrum expanded and bilobed at tip. Superior orbital border with a small projection in the middle . . *R. notopus* (Alcock)
   Side margins of carapace with two teeth (or angulations) behind ext. orbital angle. Rostrum regularly tapering to tip, not expanded or bilobed. Superior orbital border either without any prominence or with a strong tooth . . . . . 2
2. Sides of carapace strongly toothed. Supra-orbital tooth spiniform, directed forward and half as long as rostrum. Transverse sutures

1) Americ. Naturalist, v. 28, 1894, p. 1043.
2) Journ. As. Soc. Bengal, v. 63, prt 2, 1895, p. 180.
3) Ill. Zool. "Investigator", Crust., 1895, pl. 15. Cf. ALCOCK, Account Deep-Sea Brachyura "Investigator", Calcutta, 1899, p. 78.
4) Ann. Mag. Nat. Hist. (7) v. 19, 1907, p. 479.
5) Ann. Mag. Nat. Hist. (7) v. 15, 1905, p. 266.
6) Wiss. Erg. "Valdivia"-Exp. Bd 6 (Brachyura), 1904, p. 131.

on carapace (which is covered by a short fur) absent . . . . *R. chuni* Doflein (= *R. dentata* Mac Gilchrist)

Sides of carapace angular, not toothed, but everywhere finely serrated. Supra-orbital tooth absent. Two transverse sutures on carapace, which is almost hairless . . . . . *R. plumosa* n. sp.

1. *Retropluma plumosa* n. sp. Pl. 2, Fig. 1.

Stat. 254. 5° 40′ S., 132° 26′ E. Near Kei Islands. Depth 310 metres. Fine, grey mud. 1 ♂.

In some respects this species agrees either with the type species of Alcock or with the species of Doflein and of Mac Gilchrist. With *R. notopus* it shares the angular shape of the carapace (though in the new species there is one additional angulation behind the external orbital angle), the two transverse sutures, and the faint development or absence of a supra-orbital tooth; on the other hand the "Siboga" species agrees with *R. chuni* and *dentata* in the shape of the rostrum, in the granulation of the meropodites of the walking legs (as in *R. dentata*), in the 4 longitudinal sharp ridges on the dactyli (as in *R. chuni*) and in the shape of the abdomen of the ♂ (as in *R. dentata*), but as the descriptions of the different species either in this or in another point are not quite complete, several characters may be called generic rather than specific.

The carapace is wholly flattened, very slightly granular and naked, except for some short hairs at the margins. Two transverse sutures divide the surface into three parts; the anterior of which slopes obliquely-forward and terminates in the median line into a small, slender, somewhat deflexed rostrum, tapering to tip, reaching as far as the basal joints of the antennulae and beyond the line connecting the external orbital angles; the posterior part of the carapace is likewise somewhat, though less, oblique, and the convex posterior margin passes with a distinct angle into the subparallel lateral margins. The distance between the external orbital angle is $^5/_8$ of the whole breadth of the carapace, and the supra-orbital border is long, concave, and without any trace of a tooth, but showing a re-entering angle at the place where such a tooth exists in *R. chuni* and *dentata* [1]). Parting from this point, the superior orbital border passes obliquely forward to the rectangular external orbital angle, which is finely crenulate, the crenulations being directed outward at the anterior and forward at the outer border; the outer border (the antero-lateral border of the carapace) slopes obliquely-outward towards the next angulation (anterior lateral tooth), which is little prominent, finely crenulate, and connected with the angulation of the other side by the anterior, somewhat convex, transverse suture of the carapace. Behind this angulation the lateral margins of the carapace are subparallel or slightly converging posteriorly, but there is a second indentation (posterior lateral tooth) about at the level of the bases of the chelipeds. Behind these posterior teeth, and a little way

1) There is some confusion regarding the external orbital angle, among the authors. Doflein expressly states that he regards the supra-orbital tooth, to which the eye extends, as the real orbital angle and he consequently calls the next tooth, which is on the same level with this supra-orbital one, the antero-lateral tooth; hence his statement that the borders of the carapace are armed with three pairs of teeth. I have followed Alcock in regarding this latter tooth as the real orbital angle, as to this point the incomplete orbito-antennulary fossa is continued outward.

behind the middle of the distance between the posterior tooth and the hinder angle of the carapace, the latter is crossed by the second transverse suture, which is nearly straight, but somewhat produced in its median part. The length of the carapace (not including the rostrum) is distinctly shorter than the breadth; the hinder margin is longer than the distance between the external orbital angles.

There are scarcely fossae for the orbits; the eye-stalks are free, directed obliquely-outward and forward, granular at upper surface, thick and rather long ($^1/_5$ breadth of carapace); the cornea is small, occupying the tip of the stalk and semilunar in shape, if viewed from above. Laterally of the bases of the eye-peduncles is an incomplete transverse fossa, scarcely extending to external orbital angle, and incompletely closed ventrally by the inflated basal joint of the antennule, the peduncle of the antenna and the infra-orbital spine, an arrangement that is characteristic for the genus.

The infra-orbital spine is prominent, straight, directed forward and finely crenulate at the borders; it reaches beyond the basal joint of the antenna, which is quadrate, not inflated and nearly as long as the third joint; the next joint is twice as long; the flagellum consists of about 25 joints, each of which has two short hairs; the whole flagellum is half the length of the carapace. The basal joint of the antennules is globular, inflated, granular (as in *R. dentata*), freely movable (fig. 1 *a*), with the antero-internal angle somewhat projecting and giving rise to the two next joints, that are cylindrical and of about equal length (as long as the transverse diameter of the basal joint); they are much stouter and longer than the peduncle-joints of the antenna. Antennulae, antennae and infra-orbital spine arise all at the same level [1]), on the inferior border of the orbito-antennulary fossa; the eyes reach farther outward than the basal antennular joint and may touch the infra-orbital spine [2]).

The chelipeds are unequal in size, the right being the stouter, quite as in *R. dentata* and apparently also as in *R. notopus* [3]); yet the difference between the chelipeds is especially shown by the relative development of the palm and the fingers. The description given by MAC GILCHRIST is wholly applicable to my specimen: the right cheliped is thicker in all its joints, and, though the hands are of equal length, the right hand has a higher and more inflated palm, that is granular at outer surface, and as long as the fingers, whereas in the left hand the palm is much weaker and lower, and shorter than the fingers. Both palms are serrated along the upper border and the proximal half of the inferior border, and parallel to this latter border a continuous row of small granules is continued to quite near the tip of the fixed finger (fig. 1 *b*, 1 *c*). The fingers are high at the base, greatly compressed, not gaping and tapering to the acute tip; on the right side (fig. 1 *b*) the cutting margins of the fingers are provided with 3—4 very large, interlocking, obtuse but sharp-edged teeth, but on the left there are only a number of very small denticles on the fixed finger, the opposite margin of the movable finger being unarmed.

1) According to ALCOCK the antennae arise just below the infra-orbital spine, in *R. notopus*.

2) MAC GILCHRIST notes that in *R. dentata* the eye-stalks reach as far outward as the basal antennule-joint; my specimen on the other hand agrees in this respect with what is found in *R. notopus*.

3) In DOFLEIN's specimen of *R. chuni* only the right cheliped was present.

All the legs are fringed with very characteristic hairs of the same kind: they are long and flexible, and feathered. Many of these hairs, especially on the posterior legs are modified in a most peculiar way: the tip is likewise plumose, but the rest of the hair is transformed into a long, membraneous structure, that is inflated, closed all round and narrowing towards the base of the hair. Although gills, six in number, are present at either side of the thorax, it may be assumed that the transformed hairs are adopted to oxygen-breathing purposes, and as such hairs are especially numerous on the hinder legs, these should not only prevent the animal from sinking into the soft mud upon which it lives, a supposition made by ALCOCK [1]), but also perform the function of gills. Neither in the descriptions, nor in the drawings, of ALCOCK, DOFLEIN or MAC GILCHRIST did I find similar hairs, so that I believe they are characteristic for my species.

The ambulatory legs are extremely long and slender, the second pair, which is the longest, being more than 3 times the breadth of the carapace. The meropodites are 5 times as long as broad, granular at upper and under surface, serrated and hairy along the borders; in the case of the second pair the meropodite is nearly as long as the carpo- and propodite together. The propodite especially is fringed with very long hairs, that are twice or three times as long as the breadth of the joint to which they are inserted; the longest hairs are found at the under or inner border. The dactyli are very long, nearly straight, ending acutely and provided with four sharp ridges (also noted by DOFLEIN in *R. chuni*); the length of the dactyli is variable; in the first pair of legs they are relatively short, at least shorter than the propodite, and almost naked; in the second pair they are excessively long, equalling in length the likewise much elongated propodite, and again sparsely hairy; in the third pair they seem to be as long, but on the left side of the animal this dactylus is partly broken off, and on the right it is wanting altogether, its outer border is fringed with long hairs.

The posterior legs are modified in the characteristic way of the genus: they are slender and weak, much shorter than the preceding pairs, reaching somewhat beyond the middle of the length of the meropodite of the preceding legs (in the figure they are represented unfortunately slightly too long), rising almost on the back of the animal, apparently, in normal position, carried above the plane of the preceding legs and directed straight forward. The last five joints are, however, not equal in length, as stated by ALCOCK and DOFLEIN, but the carpopodite is distinctly shorter in my specimen.

The abdomen of the ♂ occupies all the space between the bases of the posterior legs; its general shape is triangular, with the 3$^{d}$ to 6$^{th}$ joint of nearly equal length; as in the other species the 3$^{d}$—5$^{th}$ joint are fused, but all the segments are distinctly defined by rather deep notches at the margins of the abdomen; the 6$^{th}$ segment, as in *R. notopus* and *R. dentata*, bears a crescentic ridge near the anterior margin, which ridge projects at either side into a sharp prominence; the terminal segment is longer than the preceding ones and somewhat longer than broad at the base, with rounded tip (fig. 1 *a*).

1) A Naturalist in Indian Seas, Calcutta, 1902, f. 55, opposite p. 252.

The outer surface of the abdomen, like the pentagonal sternum, is granular.
Dimensions in mm.:

| | | |
|---|---|---|
| Total length of carapace (including rostrum) | | 7.— |
| Length of rostrum | | 0.6 |
| Breadth of carapace | | 7.9 |
| Distance between ext. orb. angles | | 5.— |
| Length of chela | | 6.— |
| Length of first pair of ambulatory legs | | 21.— |
| Total length | of second pair of ambulatory legs | 27.— |
| Length of meropodite | | 9.25 |
| Breadth of meropodite | | 1.75 |
| Length of carpopodite [1]) | | 3.75 |
| Length of propodite [1]) | | 6.— |
| Breadth of propodite | | 1.— |
| Length of dactylus | | 6.— |
| Length of posterior pair of legs | | 8.— |

The incrustation of the animal is apparently very weak: the integument is thin, flexible and transparent.

The species of this genus have been caught at different localities of the Eastern Indian Ocean. "*Ptenoplax*" *notopus* Alcock [2]), the typical species, has been dredged near the Coromandel coast and the Andamans, in depths of 180—450 metres; Doflein [3]) records his species, *R. chuni*, caught at a depth of 614 metres, from the coast of West Sumatra, south of Nias; and finally Mac Gilchrist [4]) obtained his "*Ptenoplax*" *dentata* south-east of South Andaman Island, in a depth of 502 metres. In comparing the descriptions and figures of Doflein and Mac Gilchrist it seems to be more and more probable, that their species are really identical. Indeed, the shape of the carapace, with the conspicuous supra-orbital tooth (which is called by Doflein the external orbital angle) and the teeth at the lateral margins are exactly alike; both authors agree in the description of the rostrum, of the furry coating of the carapace, and of the much longer hairs at the front and antero-lateral borders. Again, there is no difference between the figures with respect to the walking legs: the dactyli are relatively short, at least shorter than the propodites, and the four longitudinal ridges, with which the dactyli, according to Doflein, are provided, are also shown in Mac Gilchrist's figure. Doflein's name being published a few months earlier than Mac Gilchrist's should, then, have priority.

The new species of the "Siboga" was dredged in a depth of 310 metres near the Kei Islands, and so the genus *Retropluma* (= *Ptenoplax*) may be included in the Indo-Malayan fauna.

1) Measured along anterior margin.

2) Alcock and Anderson, Journ. As. Soc. Bengal, v. 63, prt 2, 1894, p. 181, pl. 9, f. 3—3*a*—*b*. Ill. Zool. "Investigator", Crust. pl. 15, 1895, f. 2—2*a*—*b*. Alcock, Account Deep-Sea Brachyura "Investigator", 1899, p. 79.

3) Wiss. Erg. "Valdivia" Exp., Bd 6, Brachyura, 1904, p. 131, pl. 37, f. 1—2.

4) Ann. Mag. Nat. Hist. (7) v. 15, 1905, p. 266. Ill. Zool. "Investigator", Crust. prt 11, 1905, pl. 74, f. 1.

# OCYPODIDAE.

To this family belong some well known and widespread tropical genera of Crabs, that are mostly characterized by their slender, often greatly elongate eye-stalks, and the narrow front, and in some cases by the enormous development of one of the chelipeds in the ♂. All the species keep strictly to the shore and live on sandy and muddy beaches, between flood- and ebbline; the majority has burrowing habits, each individual boasting of a separate hole to itself, to which it rapidly retreats when danger is approaching. Such genera as *Ocypoda* and *Uca* (= *Gelasimus*), that live in countless numbers in suitable localities, do not fail to attract the attention of even the layman. There is in this family a clearly-pronounced tendency to estuaries, mangrove-swamps and even to fresh water, though no species may be called strictly fluviatile.

Recent writers have distinguished three subfamilies: *Ocypodinae*, *Mictyrinae* and *Macrophthalminae*, that are well defined by ALCOCK [1]) and BORRADAILE [2]).

## Subfam. OCYPODINAE.

The subfamily comprises the best known and most conspicuous representants of the family, viz. the genera *Ocypoda* and *Uca*, and, besides, only the genus *Heloecius* [3]).

1. Abdomen of ♂ almost as broad at base as the sternum; chelipeds subequal. Epibranchial regions much inflated . . . . . **Heloecius**
   Abdomen of ♂ much narrower at base than the sternum; chelipeds always unequal . . . . . 2
2. Corneae of eyes very much bulging, occupying nearly the whole ventral part of the eye-stalks; the latter club-shaped. Chelipeds of ♂ not very unequal **Ocypoda**
   Corneae of eyes small, at end of eye-stalks; the latter slender and thin. Chelipeds of ♂ very unlike, one being enormously developed . . . . **Uca**

1) Journ. As. Soc. Bengal, v. 69, 1900, prt 2, p. 342—343.
2) Ann. Mag. Nat. Hist. (7) v. 19, 1907, p. 485—486.
3) The genus *Acanthoplax* of H. MILNE-EDWARDS, with only one species (inhabiting the coast of Chile) is now fused into *Uca*.

The genus *Heloecius* Dana [1]) being not represented in the "Siboga" collection, we may pass directly to *Ocypoda*.

## Ocypoda Fabricius.

1798. *Ocypoda* Fabricius. Suppl. Entom. Syst., p. 347.

The members of this genus frequent sandy beaches, where they inhabit long burrows near high-water mark, into which they dart back when alarmed. The speed with which they dash to their burrows or to the sea is remarkable and has been especially noticed by the earliest pre-Linnean authors. The majority of the species is in the possession of a stridulating ridge, at the inner surface of the palm of the larger cheliped; this ridge is rubbed against a longitudinal rim on the ischiopodite of this cheliped, and so a squeaking sound is produced. On the habits of *Ocypoda* and the use of the stridulating ridge ALCOCK [2]) has published an interesting account.

An attempt to review the species has been made in earlier years by KINGSLEY [3]) and by MIERS [4]), but better by ORTMANN [5]). After the last revision only a few new species have been described, viz.:

*O. nobilii* de Man. Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, 1902, p. 478, pl. 19, f. 2—3, from the Baram river (Borneo) [6]).

*O. jousseaumei* Nobili. Bull. Mus. d'Hist. Nat., 1905, n° 4, p. 233, f. 2, and: Ann. Sc. Nat. (9) t. 4, 1906, p. 310, from the Red Sea.

and a new subspecies:

*O. rotundata* Miers subsp. *arabica* Nobili. Bull. Sc. France et Belgique, t. 40, 1906, p. 152, pl. 5, f. 26, from the Persian Gulf.

Besides, Miss RATHBUN remarks [7]), after examination of DANA's original specimen of *O. laevis*, that this species has always been wrongly considered identical with *O. cordimana* Desmarest, but the difference between the two species is not indicated.

The "Siboga" collected only three widely-distributed species.

1. *Ocypoda cordimana* Desmarest.

Literature: ORTMANN, Zool. Jahrb., Syst., Bd 10, 1897, p. 362 and ALCOCK, l. c. p. 349.

Stat. 40. Pulu Kawassang, Paternoster Islands. 1 ♀.
Stat. 50. Labuan Badjo, west coast of Flores. 1 ♂.
Stat. 179. Kawa Bay, west coast of Ceram. 1 ♀.

---

1) For synonymy and literature see HASWELL, Cat. Austral. Crust., 1882, p. 91. Cf. also DE MAN, Zool. Jahrb. Syst., Bd 2, 1887, p. 696.

2) Ann. Mag. Nat. Hist. (6) v. 10, 1892, p. 336.

3) Proc. Acad. Nat. Sc. Philadelphia, 1880, p. 179.

4) Ann. Mag. Nat. Hist. (5) v. 10, 1882, p. 378.

5) Zool. Jahrb., Syst., Bd 7, 1894, p. 761 and ibid., Bd 10, 1897, p. 359.

6) The author discusses at the same time the characteristic features of *O. stimpsoni* Ortmann (= *O. convexa* Stimpson nec Quoy et Gaimard).

7) Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, 1906, p. 834, pl. 7, f. 2.

The ♀ from Stat. 40 is very small (distance between ext. orbital angles 15.5 mm.); nevertheless, it is bearing eggs.

According to STIMPSON [1]) *O. laevis* Dana should be distinguished from this species by the more prominent orbital angles and by the smoothness of the edges of the hand.

*O. cordimana* seems to be more terrestrial in its habits than any other species of the genus; according to HENDERSON [2]) it lives on sandy bottom, far from the shore. DE MAN [3]) records a specimen from fresh water.

2. *Ocypoda ceratophthalma* Pallas.

Literature: ORTMANN, l. c. p. 364 and ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 345.

Stat. 40. Pulu Kawassang, Paternoster Islands. 1 ♂.
Stat. 50. Labuan Badjo, west coast of Flores. 1 ♂, 1 ♀.
Stat. 61. Lamakera, Solor Island, reef. 2 ♂, 1 ♀.
Stat. 71. Makassar. 6 ♂ (aet. div.).
Stat. 89. Pulu Kaniungan, east of Borneo. 3 ♂ (juv.).
Stat. 93. Sanguisiapo, Sulu Archip. 1 ♂.
Stat. 131. Karakelang, Talaut Islands. 2 ♂, 1 ♀.
Stat. 133. Lirung, Talaut Islands. 2 (juv.).
Stat. 179. Kawa Bay, west coast of Ceram. 2 (juv.).
Stat. 263. Great Kei Island. 3 ♂.

There is a considerable variation in the number of ridges, composing the stridulating organ. From the dorsal part of the hand downwards there are firstly some tubercles, followed by a series of thicker ridges, that are again succeeded by a series of narrower ridges, with much narrower interspaces between them. DE MAN [4]) describes a specimen, in which these latter ridges are not so closely crowded as usually; besides, the number of these two kinds of ridges is not at all constant. I also found a specimen, in which the narrow ridges were rather widely separated from each other, and the thicker ridges were obsolete and scarcely indicated.

As is well known, the horny prolongation of the eye-stalks is likewise subject to much variation, even between individuals of the same size and sex. And thirdly, the epibranchial angles may reach sideways beyond the external orbital angles or not.

3. *Ocypoda kuhli* de Haan.

Synonymy and literature: ORTMANN, Zool. Jahrb., Syst., Bd 10, 1897, p. 364.

Stat. 51. Bay of Madura. 1 ♂.
Stat. 61. Lamakera, Solor Island, reef. 1 ♂.

This widely-distributed, but apparently not very common species, is distinguished by the stridulating organ being composed of transverse tubercles or short ridges, usually few in

1) Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 111.
2) Transact. Linn. Soc. London, (2) v. 5, 1893, p. 328.
3) Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, 1902, p. 483.
4) Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, 1902, p. 478, pl. 19, f. 1.

number (8—9). In the specimen from Madura there are only 6—7 transverse tubercles, widely separated, and placed irregularly in the ventral part of the organ.

De Man [1]) already notes the much pronounced tubercles on the first sternal joint, at either side of the terminal segment of the abdomen of the ♂.

## Uca Leach.

1815. *Uca* Leach. Transact. Linn. Soc. London, v. 11, p. 309.
1820. *Gelasimus* Latreille. Dict. Sc. Nat., t. 18, p. 286.
Description: Alcock, l. c. p. 350.

The species of *Uca* are yet more frequently met with than those of *Ocypoda* on all tropical shores, where they live in great swarms, as is generally known; they prefer, however, muddy, not sandy, beaches. Alcock [2]) and, in recent years, Pearse [3]) have given a fascinating account of their peculiar habits.

Earlier writers (H. Milne-Edwards, S. J. Smith, Kingsley) have reviewed the genus, but the best synopsis of the Indo-Pacific species has been given by de Man [4]). Ortmann prepared a key for all the species. Yet there has remained some confusion in the broad-fronted species, and Ortmann [6]) is inclined to unite these species all in one species, *Uca gaimardi* H. Milne-Edwards.

The following new species have been described after the revision of de Man in 1891:

*U. zamboangana* Rathbun. Proc. U. S. Nat. Mus., v. 44, 1913, p. 615, pl. 74, from the Philippines.

*U. mearnsi* Rathbun. L. c. p. 616, pl. 75, f. 1—2, also from the Philippines; only the ♀ is known.

*U. novae-guineae* Rathbun. L. c. p. 617, pl. 76, from New Guinea.

*U. rathbunae* Pearse. Philippine Journ. Sc., v. 7, sect. D, 1912, p. 91, textfig. 1, from Manila (Philippines).

Two new subspecies have been added:

*U. inversa* (Hoffmann) subsp. *sindensis* Alcock, l. c. p. 356.

*U. annulipes* (Latreille) subsp. *orientalis* Nobili. Boll. Mus. Torino, t. 16, n° 397, 1901, p. 13, f. A.

Besides, the following alterations in the nomenclature have been made:

*U. vocans* H. Milne-Edwards should be called *U. marionis* Desmarest.

*U. forcipata* (Adams et White) de Man cannot retain its name, as the species described by the monographers of the "Samarang" is wholly unrecognizable; Ortmann (l. c., 1897, p. 350) proposes therefore to name de Man's species (l. c., 1891, p. 32, pl. 3, f. 9) *Uca demani*. I cannot make out, whether Miss Rathbun's specimens [7]) from Monte Bello Islands, western Australia, are either the true *forcipata* or *demani*.

1) Notes Leyden Mus., v. 3, 1881, p. 251.
2) Ann. Mag. Nat. Hist. (6) v. 10, 1892, p. 415.
3) Philippine Journ. Sc., v. 7, sect. D, 1912, p. 113. Also reprinted in: Smithson. Rep. 1913, 1914, p. 415.
4) Notes Leyden Mus., v. 13, 1891, p. 20.
5) Zool. Jahrb., Syst., Bd 7, 1894, p. 749.
6) Zool. Jahrb., Syst., Bd 10, 1897, p. 354.
7) Proc. Zool. Soc. London, 1914, p. 661, pl. 2, f. 8.

*U. acuta* (Stimpson) has been shown by Miss RATHBUN to be identical with *U. dussumieri* H. Milne-Edwards, and she has altered [1]) accordingly DE MAN's "*Gelasimus*" *acutus* [2]) into *Uca manii*, but I am doubtful about the admissibility of this latter name, two species within the same genus now having been called after Dr. J. G. DE MAN.

The new species, save *U. novaeguinea*, belong to the narrow-fronted species. With regard to *U. rathbunae*, I am inclined to regard it, after careful study of PEARSE's description and figures, identical with *U. coarctata* (H. Milne-Edwards) [3]). Both species agree exactly, not only in the shape of the larger chela and the row of tubercles on the lower wall of the orbit, but also with respect to the relative length of the carapace, as in both species this length is 60% of the distance between the external orbital angles [4]). PEARSE says, that, on his request, Miss RATHBUN herself has carefully compared his specimens with specimens of 13 narrow-fronted species from the Indo-Pacific region in the United States National Museum (perhaps *U. coarctata* was not among the latter), and as the result of this study the specimens were declared to represent a new species, most nearly related to *U. urvillei* (H. Milne-Edwards).

1. *Uca marionis* Desmarest.

Synonymy and description: DE MAN, Abhandl. Senckenb. Ges., Bd 25, Heft 3, 1902, p. 487 and Notes Leyden Mus., v. 13, 1891, p. 23, pl. 2, f. 5—5*a*; THALLWITZ, Abhandl. Mus. Dresden, Bd 3, n° 3, 1890/91, p. 42.

Stat. 86. Dongala, west coast of Celebes. 4 ♂, 2 ♀.
Stat. 115. Kwandang Bay, north coast of Celebes. 3 ♂.
Stat. 131. Karakelang, Talaut Islands. 5 ♂.

The considerable variation shown in the larger chela of the ♂ has induced earlier authors to discriminate several species that, however, are now all united into one. In the most common form the immovable finger bears two large, triangular and compressed teeth in the distal half. This is the subsp. *excisa* Nobili [5]), formerly called *Gelasimus nitidus* by DANA [6]), but the latter name had been used by DESMAREST already for a fossil species. A good figure of the chela is given by DE MAN (l. c., 1891, pl. 2, f. 5).

In another modification the triangular tooth near the middle of the fixed finger becomes lower and lower; the finger itself is less curved upward and more straight than in *excisa*. This subspecies is the *cultrimana* White [7]), the chela of which has been well figured by H. MILNE-EDWARDS (Ann. Sc. Nat. (3) t. 18, 1852, pl. 3, f. 4*a*), by KINGSLEY (Proc. Ac. Nat. Sc. Philadelphia, 1880, pl. 9, f. 7) and especially by DE MAN (l. c. pl. 2, f. 5*a*).

1) Proc. Biol. Soc. Washington, v. 22, 1909, p. 114.
2) Journ. Linn. Soc. London, v. 22, 1888, p. 113, pl. 7, f. 8—9, pl. 8, f. 1—4.
3) Ann. Sc. Nat. (3) t. 18, 1852, p. 146, pl. 3, f. 6. It is true, that this species has been originally recorded from Odessa on the Black Sea, but this locality seems, to say the least, most doubtful. Besides, I had an opportunity to examine undoubted specimens of *U. coarctata* from Nias, that belong to the Amsterdam Zoological Museum and were collected by Dr. P. J. KLEIWEG DE ZWAAN in 1910, and to compare these with the very specimens of DE MAN (l. c. 1891).
4) 55% in *U. urvillei*.
5) Ann. Sc. Nat. (9) t. 4, 1906, p. 315.
6) Crust. U. S. Expl. Exp., 1852, p. 316, pl. 19, f. 5.
7) Proc. Zool. Soc. London, 1847, p. 84.

Thirdly the cutting margin of the immobile finger may be devoid of larger teeth, but only finely serrated and elegantly curved; the convex portion represents the proximal larger tooth. This is the typical *marionis* of DESMAREST [1]) and the chela has been figured again in the papers of H. MILNE-EDWARDS (l. c., pl. 3, f. 5) and KINGSLEY (l. c., pl. 9, f. 8).

All these forms grade into one another, so that a sharp demarcation is impossible, the less so because the shape of the carapace and of the walking legs in the different subspecies is the same (DE MAN, l. c., 1902, p. 489).

The species has often been designated under the name of "*Gelasimus*" *vocans* Linné, but, as KINGSLEY (l. c. p. 141) explains, it is impossible to identify LINNÉ's species [2]). We should, then, prefer the earlier name *marionis* to *cultrimana*.

The forms *excisa*, *cultrimana* and *marionis* all occur in the "Siboga"-material.

2. *Uca tetragonon* (Herbst).

Synonymy and description: DE MAN, Notes Leyden Mus., v. 13, 1891, p. 24, pl. 2, f. 6, and ALCOCK, l. c. p. 357.

Stat. 47. Bay of Bima, Sumbawa. 1 ♂.
Stat. 131. Karakelang, Talaut Islands. 4 ♂, 4 ♀.
Stat. 250. Kur Island, west of Kei Islands. 3 ♂,

All specimens, save one, have a reddish-brown carapace, marbled with light green, as shown in the figure of DE MAN.

3. *Uca dussumieri* H. Milne-Edwards.

Synonymy and description: DE MAN, Journ. Linn. Soc. London, v. 22, 1888, p. 108, pl. 7, f. 2—7, and ALCOCK, l. c. p. 361.

Stat. 19. Labuan Tring, west coast of Lombok, 1 ♂.
Stat. 50. Labuan Badjo, west coast of Flores. 3 ♂.

The colour pattern of the carapace sometimes resembles that of the preceding species.

4. *Uca lactea* (de Haan).

Synonymy and description: ALCOCK, l. c. p. 355.

Stat. 19. Labuan Tring, west coast of Lombok. 1 ♂.
Stat. 47. Bay of Bima, Sumbawa. 2 ♂, 1 ♀.
Stat. 50. Labuan Badjo, west coast of Flores. 1 ♂.
Stat. 86. Dongala, west coast of Celebes. 8 ♂, 3 ♀.

5. *Uca gaimardi* (H. Milne-Edwards).

1852. *Gelasimus gaimardi* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 18, pl. 4, f. 17.
1891. *Gelasimus gaimardi* de Man. Notes Leyden Mus., v. 13, p. 39.
1913. *Uca gaimardi* Pesta. Denkschr. Ak. Wiss. Wien, Bd 88, p. 55, pl. 3, f. 3 and textfig. 2.

1) Cons. s. l. Crust., 1825, p. 124, pl. 13, f. 1.

2) H. MILNE-EDWARDS in 1837 (Hist. nat. Crust., t. 2, p. 54) described under *vocans* an American species, and afterwards (Ann. Sc. Nat. (3) t. 18, 1852, p. 145, pl. 3, f. 4) under the same name the true *cultrimana*.

Stat. 50. Labuan Badjo, west coast of Flores. 1 ♂.

This is one of the broad-fronted species, like the preceding. With *U. chlorophthalma* (H. Milne-Edwards), *U. latreillei* of the same author and *U. triangularis* (A. Milne-Edwards) it forms a distinct sub-group within the genus. The latter species is undoubtedly distinct, as shown by DE MAN [1]) but with respect to the other species, it is not unlikely, that they are all identical. *U. latreillei* is the least known, but according to DE MAN [2]) it is distinguished by broader meropodites, these being in the last pair of legs twice as long as broad. According to PESTA (l.c.) this *U. latreillei* should probably be the young stage of *U. gaimardi*, as ORTMANN [3]) has already suggested.

Whether *U. chlorophthalma* is really distinct, remains in my opinion uncertain. The larger hand of the ♂ is higher and shorter than in *U. gaimardi* [4]), and the fingers are only slightly longer than the palm, which latter is as long as high. But it is well known, that these proportions are variable among individuals of the same species; besides, in my specimen, which agrees wholly with the Leiden Museum specimens, determined by DE MAN himself, and with that of PESTA, the large chela resembles in its dimensions *U. chlorophthalma*, as it is only 2,5 times, not 3 times as long as high, but the fingers are nearly exactly as long as the palm, and the latter is longer than high, which agrees better with *U. gaimardi*.

The pretty colour pattern of this species has been well represented by PESTA. The rosy hue of the larger hand is characteristic and seems to remain even after prolonged preservation in alcohol. In my specimen it is remarkable, that the walking legs on the left exhibit nearly the same colour (rosy-yellow) as the large hand, which is on this side, but on the right the small chela, the second and fourth walking legs are dark violet, like the general colour of the carapace, whereas the first and third walking legs are coloured like those on the left.

I only once find mentioned [5]) in the literature, that the outer surface of the palm of the large chela bears, near the base of the fixed finger a small, well-defined, short-hairy depression, both in *U. gaimardi* and in *U. chlorophthalma*; of the latter species I examined the ♂, mentioned by DE MAN (l.c., 1891), in the Leiden Museum.

---

## Subfam. MICTYRINAE.

The genus *Mictyris* has often been regarded as constituting a distinct family of its own, whereas other closely related genera where included in another family or subfamily: Dotillidae or Scopimerinae. Though the genus is standing somewhat apart there is no need for such an isolation of *Mictyris*.

Among the other genera *Ilyoplax* Stimpson [6]) is undoubtedly the least known; its single

---

1) Journ. Linn. Soc. London, v. 22, 1888, p. 119, pl. 8, f. 8—11.
2) Notes Leyden Mus., v. 13, 1891, p. 41.
3) Zool. Jahrb., Syst., Bd 7, 1894, p. 752.
4) DE MAN, l.c., 1891, p. 42. See also Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, 1902, p. 484, pl. 19, f. 4.
5) MIERS. Rep. "Challenger" Brachyura, 1886, p. 245, note.
6) Proc. Acad. Nat. Sc. Philadelphia, 1858, p. 98. Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 100.

species has not been figured, and neither, as far as I know, been found again, since it was caught at Whampoa (China) living in holes of the mud, along the banks of the Canton River. Its external maxillipeds seem to resemble mostly those of *Dotilla* and *Tympanomerus*, and, like these genera, it has tympana on the legs, but the abdomen of the ♂ is said to be like that of *Macrophthalmus*, viz. regularly and slightly tapering, not constricted in the middle.

The genera of this subfamily have apparently all the same habits as those of the preceding group: they indulge in digging burrows on sandy or muddy flats along the beach, below the flood-line; occasionally some species are met with in fresh water.

The following key is meant to discriminate the genera, save *Ilyoplax*:

1. Body much globose, longer than broad. Posterior margin of carapace with a row of stiff bristles. Abdomen in both sexes widening to tip, that is broadly truncate. No tympana on the legs . . . . . **Mictyris** Latreille

   Carapace more quadrate, with elongate eye-stalks; posterior margin without a row of stiff bristles. Abdomen of ♂ normal, tapering, often constricted in the middle. Mostly tympana on the legs . . . . . 2

2. External maxillipeds of moderate size, not bulging, merus longer than ischium. Chelipeds of both sexes (especially of ♂) stouter than walking legs. Tympana absent or present . . . . . **Tympanomerus** Rathbun

   External maxillipeds very large, with a strong, almost hemispherical bulge forward. Tympana on the legs always distinct 3

3. Merus of external maxillipeds longer than ischium. The distal end of the 4th abdominal segment of the ♂ is fringed with bristles, that overlap the next segment. . . . . **Dotilla** Stimpson

   Merus of external maxillipeds shorter than ischium. 4th abdominal segment of the ♂ of normal size, but the next is more or less constricted near the base . . . . . **Scopimera** de Haan

### **Mictyris** Latreille.

1806. *Mictyris* Latreille. Gen. Crust. et Insect., t. 1, p. 40.
1837. *Myctiris* H. Milne-Edwards. Hist. nat. Crust., t. 2, p. 36.

As far as I am aware, H. Milne-Edwards was the first to replace, apparently by error, *Mictyris* by *Myctiris*, and this latter spelling has been adopted by most subsequent authors.

The two species, one with a wide Indo-Pacific range, the other only found at the coast of East-Australia, Tasmania and New-Zealand, may be discriminated thus:

Gastric region of carapace nearly smooth. Postorbital spine prominent. Chelipeds long, fingers about twice as long as palm, upper and lower margin of palm carinate. Propodites of walking legs not much depressed. . . . . *M. longicarpus* Latreille

Gastric region of carapace with small granular points, few in number and prominent. Postorbital spine absent, only a granulate projection. Chelipeds short and bulky. Propodites of walking legs much depressed, broader than carpopodites *M. platycheles* H. Milne-Edwards [1])

1. *Mictyris longicarpus* Latreille.

Synonymy and description: ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900.

Stat. 131. Karakelang, Talaut Islands. Reef. 8 sp.
Stat. 231. Ambon, reef. 3 sp.
Stat. 323. Bawean Island, Java Sea. Reef. 1 sp.

ALCOCK's description agrees exactly with all the specimens from different localities, in the Leiden Museum.

On examining DE HAAN's original specimens of *M. deflexifrons* [2]) I came to the conclusion, just like DE MAN [3]), that this species is identical with *M. longicarpus*, the only difference consisting in the occasional very faint development of the postorbital spine. That the strong spine at the inner margin of the ischiopodite is nearly obliterated or wholly absent in the ♀ has been noticed already by ALCOCK. To complete the description of the latter I only remark, that the inner surface of the palm of the cheliped is provided with a short, longitudinal ridge.

We may safely assume that STIMPSON founded his *M. brevidactylus* [4]) on specimens that really were nothing than the common *M. longicarpus*.

The name of LATREILLE's species has been sometimes spelled *longicarpius* and *longicarpis*, but LATREILLE in his first description used the orthography *longicarpus*.

That the species has much the same habits as *Uca* and is likewise gregarious at suitable localities appears from the following interesting passage in R. SEMON's fascinating book [5]): "On sauntering about the sandy beach before my house, I often perceived, that during ebb-tide the sand was by no means smooth, but covered with millions of tiny star-shaped heaps of sand. In the centre of each little heap I remarked a small canal, leading into the ground and serving as a lodging to a tiny crab *Mictyris longicarpus*. While the water covers the beach, the crab remains below the surface. Hardly, however, has the shore become dry, than it will pop up, throwing out the sand above its hole and chewing it to infinitesimal particles in search of tiny organisms imbedded in it. As thousands and millions of little crabs pursue this occupation at the same time, the coast soon has the appearance of being prettily and carefully raked, like a well-kept garden". As to the manner of feeding it is remarkable that the fingers of *Mictyris* end acutely and are apparently not so well adapted to the purpose as is the case in genera

1) Ann. Sc. Nat. (3) t. 18, 1852, p. 154. TARGIONI-TOZZETTI, Crost. Viag. "Magenta", 1877, p. 186, pl. 11, fig. 6. STIMPSON, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 103, pl. 13, f. 5.

2) Faun. Japon., Crust., 1835, p. 25 (sine descriptione).

3) Notes Leyden Mus., v. 12, 1890, p. 83.

4) Proc. Acad. Nat. Sc. Philadelphia, 1858, p. 99. Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 103, pl. 13, f. 4. See also ORTMANN, Zool. Jahrb., Syst., Bd 7, 1894, p. 748. It must be noted, however, that ZEHNTNER (Rev. suisse zool., t. 2, 1894, p. 177, pl. 8, f. 21—22) maintains the distinctness of *M. brevidactylus*, but his arguments seem to me to be of little importance. The "Siboga" specimens at least could, by a mixture of characters, be referred as well to either of the two species.

5) In the Australian Bush, Engl. transl., London, 1899, p. 491. The observation was made during the writer's stay at Amboyna.

with similar feeding habits (*Uca*, *Macrophthalmus*, *Euplax* a. o.), where the fingers are spooned and ornamented with stiff hairs at the tip.

### **Dotilla** (de Haan) Stimpson emend.

1833. *Doto* de Haan. Faun. Japon., Crust., 1833, p. 24 (praeocc.).
1858. *Dotilla* Stimpson. Proc. Acad. Nat. Sc. Philadelphia, 1858, p. 98.

The genus is widely distributed throughout the Indian region, from the Red Sea and the east coast of Africa to the Moluccas. It does not seem, however, to be represented in the Pacific Ocean. Each species is somewhat restricted in its range, so *D. fenestrata* is characteristic to the east coast of Africa, ranging from Zanzibar and Moçambique to the Cape of Good Hope, *D. sulcata* inhabits the Red Sea and neighbouring coasts, *D. blanfordi*, *brevitarsis*, *clepsydrodactylus*, *intermedia* and especially *D. myctiroides* occur on the coasts of British India etc. One single species has been caught by the "Siboga".

I prepared the following key to the rather numerous (11) species:

1. Tympana present on the sternum . . . . . 2
   No tympana on the sternum . . . . . 3
2. Carapace at least as long as broad. Chelipeds 3—4 times as long as the carapace and much longer than the walking legs, carpopodite of cheliped very much elongated, about as long as the carapace. Species of British India . . . . . *D. myctiroides* H. Milne-Edwards [1])
   Chelipeds about twice the length of the carapace. Fingers longer than palm, both with a larger tooth in the middle. Species of East Africa . . . . . *D. fenestrata* Hilgendorf [2])
3. Meropodites of walking legs dilated, only little more than twice as long as broad. . . . . 4
   Meropodites of walking legs not dilated, distinctly more than twice as long as broad . . . . . 6
4. Dactyli of walking legs as long as, or shorter than, propodites 5
   Dactyli of walking legs distinctly longer than propodites. Tympana on the legs strongly marked, occupying the entire width and about three-fourths the length of the meropodites. Carapace very thick, about as high as long. Epistome reduced. Merus of external maxillipeds very large, broader than long, and about three times as large as the ischium . . . . . *D. sigillorum* Rathbun [3])

1) Ann. Sc. Nat. (3) t. 18, 1852, p. 152, pl. 4, f. 24. Synonymy and description: ALCOCK, l. c. p. 368. Both HENDERSON (Transact. Linn. Soc. London (2) v. 5, 1893, p. 390) and LANCHESTER (Proc. Zool. Soc. London, 1900, p. 760, pl. 47, f. 14) refer this species to the genus *Scopimera*, but the abdomen of both sexes, as figured by the latter author, is absolutely *Dotilla*-like.

2) v. D. DECKEN's Reisen in Ost-Afrika, Bd 3, 1., 1869, p. 85, pl. 3, f. 5. Synonymy: STEBBING, Ann. S. Afr. Mus., v. 6, prt 4, 1910, p. 329.

3) Proc. U. S. Nat. Mus., v. 47, 1914, p. 83. One single specimen (♀) was found at Sandakan Bay (Borneo).

5. Carapace granulate, with a broad, longitudinal, median groove, extending backward to the intestinal region. Palm of cheliped at outer and inner surface with a longitudinal piliferous line, close to the under margin of the palm and continued on both surfaces of the immobile finger; a similar line is observed at both surfaces of the dactylus. Tympana on the legs very large . . . . . *D. brevitarsis* de Man [1])

Carapace finely punctate, not granulate; the longitudinal median groove extends only to the gastric region. Palm of cheliped without longitudinal piliferous lines, neither are there any on the fingers; only the dactylus has two crests. Tympana on the legs indistinct; carpo-propodite and dactylus densely tomentose . . . . . *D. profuga* Nobili [2])

6. Nearly the whole outer surface of the merus of the external maxillipeds occupied by a convoluted sulcus, in such a way that the elevated parts of the surface constitute a W-shaped figure. Surface of carapace grooved, the sulci constituting roughly a five-rayed star, the anterior ray directed forward on to the front, the antero-lateral rays passing on to the external orbital angles, the posterior rays directed obliquely-backward and triple . . . . . *D. sulcata* Forskål [3])

Convoluted groove at outer surface of merus of external maxillipeds confined to lateral part of this surface . . . 7

7. A large quadrangular tooth in the middle of the inner margin of each finger of the chela . . . . . *D. clepsydrodactylus* Alcock [4])

Fingers of chela without large teeth . . . . . 8

8. A transverse groove on the carapace, close and parallel to the posterior border . . . . . 9

No transverse groove on the carapace; the latter strongly areolated, cardial and intestinal region circular, undivided by a longitudinal sulcus, quite smooth and non-granular. Last pair of legs without tympana on the dorsal surface of the meropodites . . . . . *D. malabarica* Nobili [5])

9. Merus of external maxillipeds about twice as large as ischium, granular. Fingers of chela not very much longer than palm 10

1) Journ. Linn. Soc. London, v. 22, 1888, p. 130, pl. 9, f. 1—3. Alcock, l. c. p. 367. It occurs in the Mergui Archipelago.

2) Boll. Mus. Torino, t. 18, n° 447, 1903, p. 22. Some specimens were found in fresh water in the Upper Sadong River (Borneo).

3) Literature: Nobili, Ann. Sc. Nat. (9) t. 4, 1906, p. 315. The autor is inclined to unite this well-known species of the Red Sea with *D. affinis* Alcock (l. c. p. 365, Ill. Zool. "Investigator", Crust. prt 10, 1902, pl. 63, f. 1) for the differences enumerated by Alcock do not prove to be constant in examining a large material. Laurie (Journ. Linn. Soc. London, v. 31, n° 209, 1915, p. 468—469) likewise supports Nobili's opinion in an even more elaborate way.

4) L. c. p. 367, Ill. Zool. "Investigator", Crust. prt 10, 1902, pl. 63, f. 2. Found on the shore of the Mahanaddi Delta.

5) Boll. Mus. Torino, t. 18, n° 452, 1903, p. 20, f. 6. Common at Mahè (Seychelles).

Merus of external maxillipeds not much superior in size to ischium, internal half of the former smooth. Fingers of chela about $2^1/_2$—3 times as long as palm, the former finely serrated at inner margins. . . . . *D. intermedia* de Man [1]).

10. Mesogastric region of carapace divided into five large tubercles and with two narrow, crossing sulci, one transverse, the other longitudinal, the latter continued backward on to the broad transverse sulcus of the carapace . . . *D. blanfordi* Alcock [2])

Mesogastric and cardiac region of carapace not subdivided, granulate; transverse, posterior sulcus interrupted in the middle, between the posterior ends of the branchio-cardiac grooves. Outer surface of meropodite of cheliped with two tympana, the proximal one the larger, near under border of arm, the distal one rounded, situated in the angle between the carpal and superior border. . . . *D. wichmanni* de Man

1. *Dotilla wichmanni* de Man.

1892. *Dotilla wichmanni* de Man. pl. 18, f. 8. | Weber's Zool. Erg. Reise niederl. Ost-Indien, Bd 2, p. 308,
1895. *Dotilla wichmanni* de Man. | Zool. Jahrb., Syst., Bd 8, p. 577.
1910. *Dotilla wichmanni* Rathbun. | K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n$^0$ 4, p. 324.

Stat. 131. Karakelang, Talaut Islands. Reef. 1 ♂.

My specimen is distinctly larger than the largest specimen of DE MAN, as the length of the carapace is 7.75 mm.; nevertheless, it agrees perfectly with DE MAN's elaborate description. In specimens from Atjeh, described by DE MAN in 1895, the movable finger of the chela scarcely shows a trace of the longitudinal, granulate ridge in the middle of the cutting margin; my specimen agrees, however, with DE MAN's original specimens from Celebes, in which this ridge-like teeth is distinct. Miss RATHBUN, who records this species from several localities in the Gulf of Siam, adds the following remark (on authority of the collector Dr. TH. MORTENSEN): "these small crabs make small balls of sand, thrown out from their holes".

## **Scopimera** de Haan.

1833. *Scopimera* de Haan. Faun. Japon., Crust., p. 24.

DE MAN [3]) proposes to unite this genus with *Dotilla*, and indeed the two genera resemble each other closely in outer appearance, but ALCOCK has enumerated several characters by which the present genus is distinguished. Besides, in the typical species, the only one I could examine, there is an opening between the bases of the first and second walking legs,

1) Journ. Linn. Soc. London, v. 22, 1888, p. 135, pl. 9, f. 4—6. ALCOCK, l. c. p. 365. Plentiful on Sullivan Island (Mergui Archip.).
2) L. c. p. 366. Ill. Zool. "Investigator", Crust. prt. 10, 1902, pl. 63, f. 3. Observed on the coasts of Sind and Baluchistan.
3) Journ. Linn. Soc. London, v. 22, 1888, p. 129.

bordered by stiff bristles and leading into the branchial cavity, in the same way as occurs in *Ocypoda* and *Uca*, where, however, this opening is found between the bases of the second and third ambulatory legs.

The four known species of the genus, none of which are found in the Indo-Malayan region, may be distinguished by means of the following key:

1. Carapace obscurely sculptured, slightly granulate or hairy on branchial regions. Fifth segment of abdomen of ♂ constricted at base, but not linear . . . . . 2

   Carapace at inner branchial region sculptured on a petaloid pattern. Fifth segment of abdomen of ♂ much constricted, linear. Dactyli of walking legs in the 1st to 3d pair of walking legs a little longer than, in the last pair twice as long as, the propodites . . . . . *Sc. crabricauda* Alcock [1])

2. Side walls of body covered with setiferous granules; carapace granular, the granules partly arranged on irregular tubercles. Side borders of carapace diverging backward, external orbital angle with an emargination immediately behind. Tympana on meropodites of walking legs not subdivided 3

   Carapace irregularly granular; side borders parallel; external orbital angle not followed by an emargination. Eye-stalks very thick, club-like (as in *Ocypoda*). Tympana on meropodites of walking legs subdivided by a longitudinal ridge *Sc. investigatoris* Alcock [2])

3. Meropodite of cheliped very short, not projecting beyond carapace; carpopodite (wrist) with a spine at inner border; movable finger near base of cutting margin with a large, quadrangular tooth . . . . . *Sc. inflata* A. Milne-Edwards [3])

   Meropodite of cheliped elongate, nearly equalling length of carapace and projecting beyond the latter; carpopodite and movable finger unarmed . . . . . *Sc. globosa* de Haan

1. *Scopimera globosa* de Haan. Pl. 3, Fig. 3.

1835. *Ocypode (Scopimera) globosa* de Haan. Faun. Japon., Crust., p. 53, pl. 11, f. 3, pl. C.
1852. *Scopimera globosa* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 18, p. 153.
1858. *Scopimera tuberculata* Stimpson. Proc. Acad. Nat. Sc. Philadelphia, 1858. p. 98.
1890. *Scopimera globosa* F. Müller. Verhandl. naturforsch. Gesellsch. Basel, Bd 8, p. 475.
1894. *Scopimera globosa* Ortmann. Zool. Jahrb., Syst., Bd 7, p. 747.
1898. *Scopimera globosa* Koelbel. Wiss. Erg. Reise Béla Széchenyi in Ost-Asien, Bd 2, p. 572.
1907. *Scopimera tuberculata* Stimpson. Smithson. Inst., Miscell. Coll., v. 49, p. 102.

This Japanese species, that has been recorded also from Ceylon by F. Müller, was not

1) L. c. p. 370. Ill. Zool. "Investigator", Crust. prt 10, 1902, pl. 63, f. 5. Found at Karachi.
2) L. c. p. 369. Ill. Zool. "Investigator", Crust. prt 10, 1902, pl. 63, f. 4. Collected at Diamond Island (Burma).
3) Journ. Mus. Godeffroy, t. 4, 1873, p. 83. The locality is only given as: "Mers des Indes".

found by the "Siboga", but the original specimens of DE HAAN being still preserved in the Leiden Museum I had an opportunity of affording some few informations about them.

STIMPSON seems to have been led astray by DE HAAN's description and figure, from which the former author concluded, that the carapace in *Sc. globosa* is smooth, and the suture between ischium and merus of the external maxillipeds is transverse, not oblique, and therefore the species *Sc. tuberculata* was established by the American author. In reality, however, in *Sc. globosa* the carapace is by no means smooth, but studded with granules, and the ischium-merus suture of the external maxillipeds is oblique. KOELBEL already supposed the two species to be identical.

The body is very thick, convex, *Dotilla*-like; the carapace is narrower than the diameter of the body above the bases of the legs, so that the side walls are sloping outward. The external orbital angles are defined posteriorly by an emargination; the distance between these angles is only slightly more than the length of the carapace, but seems to be much greater, owing to the very oblique supra-orbital margins. The front is obliquely bent downward, elongate, spatuliform, rounded at anterior margin, with a shallow longitudinal groove, that is not continued backward on the mesogastric region; at either side of this sulcus the front is somewhat rugose. The grooves defining the gastric and cardiac regions are present, though faint; the cervical groove is interrupted in the middle, and each half is curved somewhat backward; hepatic and branchial regions are crossed by irregular and short, transverse grooves, the regions themselves are very declivous and everywhere studded with little prominent, granular tubercles, widely apart, and most crowded on the hepatic regions. Some of these tubercles are setiferous. KOELBEL remarked, that in young specimens, as might be expected, the granulation of the gastric area is scarcely indicated, but becomes more pronounced with advancing age, when also the cardiac region becomes granular. The lateral margins of the carapace are ciliated and diverging backward; they are accompanied along their course by a sulcus, that immediately behind the emargination following the external orbital angle is concealed in upper view of the animal by the bulging lateral part of the hepatic region. Immediately beneath the lateral margin of the carapace, there is another longitudinal sulcus, disappearing backward, but distinct anteriorly and continued as a narrow groove below the infra-orbital margin, which itself is finely granulate. The pterygostomial and subbranchial region are entirely covered with large, setiferous granules, and the former region is defined posteriorly by a vertical sulcus. Epistome distinct. Basal joint of antennulae, at either side of the front, clypeiform, somewhat inflated and partly concealing the bases of the eye-stalks, which latter are rather short and thick, gradually widening distally. The borders of the buccal cavity are much arcuate, and the lateral part, that is defined anteriorly by a deep emargination, is curved upward and accompanied by a deep parallel groove. External maxillipeds strongly bulging, as in *Dotilla*, but merus shortly triangular, with the sides arcuate, and somewhat shorter than the ischium; suture between them oblique, not transverse, as DE HAAN depicts it; both ischium and merus very broad, operculiform; exognath short and weak; ischium with a longitudinally-oblique row of hairs near outer margin, and with a patch of hairs below it; three last joints of maxilliped covered with hairs, carpus the longest and most bulky, with a brush of stiff, feathered hairs

near the distal end, that nearly wholly conceal the next segment; terminal segment slender, tapering. Inner margin of ischium and merus thickly fringed with feathered hairs (fig. 3*a*).

The abdomen of the ♂ has been well figured by DE HAAN, but his figure being two small, details are difficult to detect. The first segment is the broadest of all, but very short; the next is narrower and again shorter; the third and fourth segment retain the same breadth, and the former is longer than the next, that is waved at the anterior margin; the fifth segment is much narrower at the base, it gradually widens distally to nearly the breadth of the second segment and is as long as the preceding segments taken together; the penultimate segment has somewhat convex side margins and is shorter than the preceding; the terminal segment finally is semi-circular.

The chelipeds are elongate and slender, twice as long as the carapace, but outreached by the anterior pair of walking legs by the length of the dactylus. All the segments are granular; the meropodite is long and widening distally, sharply-edged above, with some few stiff hairs, but spineless; tympanum at outer surface much smaller than the opposite one; the wrist is elongate, likewise unarmed, but with a brush of hairs near the proximal end of the inner margin; the palm is as long as the fingers, low, and rounded at the borders; the fingers are elongate, not gaping, and pointed at tip; outer and inner surfaces of both fingers are marked by a longitudinal row of granules, and the under border of the fixed finger is provided, like the back of the movable finger, with two similar rows; the cutting margins of the fingers are finely crenulate, and in some cases there is a faint prominence, resembling a tooth, in the proximal half of the movable finger.

Of the walking legs the length gradually diminishes from before backward; the meropodites are narrowing distally and unarmed; the dactyli are somewhat curved and as long as the propodites, save in the last pair of legs, where the dactylus is quite straight, even curved backward and distinctly longer than the preceding joint. The hairy-edged pouch leading into the branchial cavity and situated between the first and second pair of walking legs has been already mentioned. Whether such a structure exists also in the other species of this genus is unknown to me, as I have, neither with regard to *Sc. globosa* nor to the other species, found anything in the literature concerning this.

### **Tympanomerus** Rathbun.

1835. *Cleistostoma* (part.) de Haan. Fauna Japon., Crust., p. 26.
1888. *Dioxippe* de Man. Journ. Linn. Soc. London, v. 22, p. 137 (praeocc.).
1897. *Tympanomerus* Rathbun. Proc. Biol. Soc. Washington, v. 11, p. 164.

The genus, of which "*Cleistostoma*" *pusilla* de Haan is the type, comprises some small crabs, which, though sometimes resembling *Dotilla* and the like by the presence of tympana on the legs, in their general appearance approach *Macropthalmus*, for the body is less cubical than in *Dotilla* and the carapace is decidedly broader than long. By the shape of the abdomen of the ♂ and of the external maxillipeds they are decidedly related to *Scopimera*, but the ischium of the external maxillipeds is shorter than the merus. The ♂ sex especially is remarkable by the bulky size of the chelipeds, that are much stouter than the ambulatory legs.

The "Siboga" collected, besides one already known species, another, that is apparently new.

Key to the species:

| | |
|---|---|
| 1. Tympana on meropodites of walking legs present . . . . | 2 |
| Tympana on meropodites of walking legs absent . . . . | 5 |
| 2. Upper orbital margin transverse, not sloping. Lateral borders of carapace arcuate, convex; carapace itself with short, transverse, setiferous rugosities . . . . . | *T. deschampsi* Rathbun [1]) |
| Upper orbital margin much sloping backward. Lateral borders of carapace concave or straight, but markedly converging backward; carapace itself nearly smooth . . . . . | 3 |
| 3. Eye-stalk continued beyond the cornea into a long, cylindrical horn, somewhat resembling that of *Ocypoda ceratophthalma* (Pallas). A tooth behind external orbital angle . . . . | *T. ceratophorus* (Koelbel) |
| Eye-stalk not continued beyond the cornea . . . . . | 4 |
| 4. External orbital angle produced, defined posteriorly by an emargination. Both fingers of chela longitudinally carinate. Abdomen of ♂ not constricted in the middle . . . . . | *T. pusillus* (de Haan) [2]) |
| External orbital angle directed forward, not followed posteriorly by an emargination. Fingers of chela not carinate. Abdomen of ♂ constricted in the middle . . . . . | *T. integer* n. sp. |
| 5. Lateral margins of carapace diverging backward. Carpopodite of cheliped much elongate, with an obtuse prominence near proximal end of inner margin, meropodite very short, scarcely projecting beyond carapace . . . . . | *T. orientalis* (de Man) [3]) |
| Lateral margins of carapace subparallel (convex) or converging backward. Carpopodite of cheliped of ordinary shape and unarmed . . . . . | 6 |
| 6. Upper orbital margin transverse. Palm of chela with a reticulating pattern, immovable finger on a level with lower border of palm. Walking legs short and rather thick. . . . . | *T. stapletoni* de Man [4]) |
| Upper orbital margin sloping. Palm of chela granular, not reticulate, immovable finger bent downward. Walking legs long and narrow . . . . . | *T. philippinensis* Rathbun [5]) |

1) Proc. U.S. Nat. Mus., v. 46, 1914, p. 356, pl. 32, pl. 33, f. 1. It has been recorded from Shanghai and Korea. Notwithstanding the tympana on the legs, save the last pair, this species exhibits an unmistakable resemblance to *T. stapletoni* de Man, but the front is rounded, not angled, the palm has a longitudinal ridge close to and parallel with the under border, and the shape of the abdomen of the ♂ is somewhat different (RATHBUN).

2) *Ocypode (Cleistostoma) pusilla* de Haan. Faun. Japon., 1835, p. 56, pl. 16, f. 1. Hab. Japan.

3) *Dioxippe orientalis* de Man. Journ. Linn. Soc. London, v. 22, 1888, p. 138, pl. 9, f. 8—10. Hab. Mergui Arch.

4) Rec. Ind. Museum, v. 2, prt 3, 1908, p. 212, pl. 18, f. 1. In brackish water of the Dacca District (Eastern Bengal).

5) Proc. U.S. Nat. Mus., v. 47, 1914, p. 84. Hab. Philippines.

1. *Tympanomerus ceratophorus* (Koelbel). Pl. 2, Fig. 2.

1898. *Dioxippe ceratophora* Koelbel. Wiss. Erg. Reise Béla Széchenyi in Ost-Asien, Bd 2. p. 573, Pl. 1, f. 8—12.

Stat. 33. River near Pidjot, Lombok. 1 ♂.

Though KOELBEL has given a most accurate description and an excellent figure of this species, the paper cited above appears to be very rare [1]) and I presume, that it is therefore not superfluous to give a new description.

As in *Tympanomerus pusillus* the carapace is rather flattened, roughly pentagonal, and with the regions very obscurely defined. The gastric area is broad, smooth, with a short longitudinal sulcus on the anterior part, which sulcus is sharply defined posteriorly, but gradually disappears proximally. Hepatical regions scarcely distinct from gastric area, sloping laterally and forward, towards the orbit. Cervical groove, dividing gastric and cardiac area, rather distinct, short and concave. Cardiac area small, hexagonal [2]). Intestinal region occupying the entire posterior part of the carapace, and defined anteriorly, as is usual in this genus, by a ridge, which in our species is curved, with the concavity turned backward; the region presents so a narrow, crescent-shaped outline. Branchial regions somewhat roughened and sloping like the hepatical regions, but not at all separated from the latter; only the inner branchial areas are somewhat defined and faintly bulging.

Front, as KOELBEL remarks, at base about $^1/_5$ the distance between the external orbital angles, with slightly converging side borders that pass with very much rounded angles into to somewhat convex anterior border, which latter is almost imperceptibly produced in the middle; the front is almost perpendicularly deflexed and exhibits two stiff hairs implanted near the anterior angles and also shown in the figure 2. Supra-orbital borders wavy, much sloping backward, especially in their outer half, but almost transverse near the outer angle, microscopically beaded. The distance between these angles is about $1^1/_2$ times the length of the carapace; the angle themself (fig. 2*a*) is peculiar, it is short, directed straight outward and very obtuse [3]), below the lateral margin there are some few feathered hairs projecting beyond the margin: posteriorly the angle is followed by a deep, almost semi-circular notch, ending posteriorly in a very small tubercle (epibranchial angle); the distance between these angles is very slightly less than that between the anterior angles of the carapace [4]). Behind the epibranchial angle the lateral margin of the carapace describes a sigmoid curve, which is finely granulate, with a row of curious, club-shaped, short hairs (auditory or sensory) in its anterior part, and sloping almost perpendicularly towards the base of the penultimate leg. Dorsally this lateral margin is accompanied by a less curved and not continuous ridge at either side of the carapace, thus separating off a strip of the carapace, that is roughly granulate; in dorsal view we remark the bulging subbranchial region projecting beyond the sigmoid lateral margin, the distance between the posterior

1) Thanks to the kindness of Dr. DE MAN I have been enabled to consult it.

2) KOELBEL mentions a very faint longitudinal groove on this region, which I have not been able to detect.

3) According to KOELBEL's figure the lateral margin is serrulate; in my specimen I observed likewise three small prominences, that were, however, much less conspicuous.

4) KOELBEL's measurements indicate, that in his specimen the reverse is the case.

ends of which latter is somewhat less than that between the epibranchial angles. The hind margin of the carapace is straight and only $^2/_3$ of the distance between the anterior angles.

The abdomen, as KOELBEL remarks, is almost wholly similar to that of *Scopimera globosa* (fig. 2 *c*), but the fourth segment has less produced anterior angles and is about as long as the preceding segment; the fifth segment is narrower at the base, not longer than the next, and the terminal segment is not semi-circular, but semi-elliptical. It is curious to note, that in the type species, *T. pusillus*, the abdomen of the ♂ is of the ordinary shape, and is not constricted at all in the middle.

The infra-orbital border projects much forward beyond the supra-orbital one and presents a number of remarkable features, the principal one being that is divided into two parts, which induced KOELBEL to make this species the type of a new subgenus, which he called *Tmethypocoelis*. The inner part is the longest, twice as long as the outer part, concave in front view, and straight, somewhat sloping in dorsal view; it is somewhat granular, the granules alternating with very short hairs, that resemble those on the lateral border of the epibranchial angle, and is separated from the outer part of the border by a very deep notch, resembling that between the external orbital angle and the epibranchial tooth. The outer part of the border is more sloping and meets the carapace at the level of the epibranchial tooth (so that the external orbital angle is wholly free at its under surface), but before joining the carapace it is deeply concave; this outer part of the border is ornamented in the same way as the inner part. As to the latter is must be added, that immediately below the border, at the ventral wall of the orbit a row of granules, parallel with the border itself, is running, and that somewhat lower (in upper view apparently parallel to the inner part of the border, but in reality straightly) a row of long hairs is found, running from the base of the eye-stalk to near the deep notch dividing the infra-orbital border; these hairs increase in length towards the outward and the terminal hairs are directed dorsally.

The side walls of the body are perpendicular in the fore parts, but somewhat sloping outward at the subbranchial regions; they are everywhere covered with setiferous tubercles. Pterygostomial regions not longitudinally grooved and not defined from the subhepatical regions, that again pass imperceptibly into the subbranchial parts; these latter are faintly divided into two parts by a somewhat raised rim, running obliquely from the epibranchial tooth to the base of the penultimate leg, but gradually disappearing in the terminal half, as KOELBEL already mentions, but the development of this rim seems to vary individually.

The eye-stalks are widening somewhat distally and the cornea, that does not exactly reach as far as the external orbital angle, is bulging. The eye-stalk is continued beyond the cornea and projects as a cylindrical horn considerably beyond the eye, as this horn is $^2/_3$ of the length of the eye-stalk itself; the end is provided with some short, stiff hairs, disposed in single file, but deciduous (according to KOELBEL). This remarkable feature of the species, that makes it look like *Ocypoda ceratophthalma* (Pallas), distinguishes it at once among all other species of this and the next subfamily.

The lateral margins of the buccal frame are somewhat concave, accompanied by a sulcus

on the pterygostomial regions and marked off anteriorly by a projecting acute tooth; the anterior margin of the frame projects obtusely (KOELBEL ascribes to it a triangular shape). An epistome is distinct. The basal joint of the peduncle of the antennulae is globular, inflated, partly covered by the front, and resembles that of *Scopimera globosa*. KOELBEL pretends that the flagellum of the antennae reaches about to the middle of the eye-stalk, but in my specimen it is not quite so long.

The external maxillipeds in my specimen do not completely close the buccal cavern, though they do so, according to KOELBEL; they are vaulted, but not quite so broad and operculiform as in *Scopimera globosa*. The ischium is nearly quadrate, with parallel margins (fig. 2*b*) and near the anterior margin, that is transverse and slightly concave, there is a row of cilia in single file across the ischium, which cilia are longest in the outer half. The merus, as KOELBEL rightly remarks, is only very slightly longer than the ischium; the lateral margins are convex, especially the inner, where in the middle a bunch of long, flexible and feathered hairs projects. The flagellum again resembles that of *Scopimera globosa*: the thick carpus occupies the whole, though very short, anterior margin of the merus, and bears a tuft of long, feathered hairs near the distal end, so as to conceal almost wholly the next joint; similar feathered hairs are inserted at the under margin of the carpus; the terminal joint is twice the length of the preceding, slender and gradually tapering. Both ischium and merus are covered with widely separated and very short hairs at their outer surface.

The chelipeds of the ♂ are remarkably long, owing to the great elongation of the arm and wrist and to the bulky size of the palm. KOELBEL mentions one specimen in which the right chela is somewhat larger than the left, but in my specimen the chelae are equal in size. The ischiopodite is unarmed, but the meropodite (arm) is sharply three-faced, with serrulate borders and concave surfaces; the tympanum on the inner surface is, as KOELBEL says, broadly-oval and surrounded by a few long hairs; the outer tympanum is longer, half as long as the meropodite, but narrower and less distinctly marked. The space not occupied by the tympana is largely beset with granules, especially in the distal half of the inner surface, and the whole arm is equal in length to the carapace. The carpopodite (wrist) is two-thirds the length of the meropodite, flattened at inner and convex at outer surface, unarmed, except for the fine serrulation of the borders, smooth, but granulate at outer surface, and the granules are arranged in a more or less distinct, oblique row, near the proximal half of the inner margin of the wrist; this inner margin projects distally in a long prominence (before which a subdistal, low tooth is present), articulating with a triangular tooth at the proximal end of the upper border of the palm. The chela is very bulky, nearly equalling in length the distance between the anterior angles of the carapace; the height of the palm is three-fourths its horizontal length, which latter is about twice the length of the immobile finger. The outer surface of the palm is somewhat flattened, the inner convex, both are very finely granulate, upper and under border are sharp and crenulate, and the lower border passes straight to that of the immobile finger; the upper part of the inner surface is more roughly granulate and these granules extend upward as far as to the somewhat raised, sharply-cut superior edge, that terminates proximally in a prominent, triangular tooth, with which the distal and superior tooth of the wrist articulates. The fingers are very much gaping at their base, the fixed finger is perfectly

straight, and both margins are parallel, but the terminal fourth of the inner margin, that is crenulate throughout, abruptly slopes towards the slightly spooned and hairy tip; the movable finger is much curved, broadest at base, and as long as the upper border of the palm, the back of the finger, though generally rounded, is nevertheless slightly carinate and crenulate in the middle, and the proximal three-fourths of the back is enlarged by a peculiar expansion, widening distally and at its broadest part freely projecting, but only present on the outer part of the finger; the outer surface of the latter has an irregular row of very fine granules; the inner margin, like that of the antagonist, is roughly crenulate, but most of the proximal half is occupied by a large prominence, the tip is likewise spooned and hairy. KOELBEL already accurately describes the chela, but according to this author, the height of the palm is less in proportion to its length and the inner margin of the dactylus has no large, obtuse prominence, but only a triangular tooth, that corresponds with a broad sinus on the opposite margin; most likely individual variations in this respect will be frequently met with.

The Austrian author calls attention to the peculiar articulation of the cheliped, which articulation, when the limb is extended, causes the chela to be nearly horizontal and not oblique, as is the usual case; even if the cheliped be folded together, the plane of the chela is not vertical but directed obliquely forward from the upper to the lower border, though this is more conspicuous in the left than in the right chela. This articulation is due to the fact, that the inner margin of the wrist is greatly elongated and its distal articulation with the palm is situated rather on the outer surface of the latter (which surface in the outstretched condition of the cheliped becomes the upper or dorsal side) than at the beginning of the superior border. KOELBEL's description is to my mind somewhat confuse, however, and even wrong, for he pretends, that the surface of the palm, that in the folded condition is the outer surface, becomes the inner surface if the limb be outstretched, and the formerly inner surface changes its position so as to become the outer side, so that the fixed finger is lying above the dactylus! Such an extreme contortion does not take place and would be most unnatural.

The meropodites of all the ambulatory legs are about $2^1/_2$ times as long as broad, as long as the two next joints together, narrowing towards both ends, hairy along the margins, but otherwise unarmed, and provided at both sides with oval tympana, that occupy the greater part of the surface, save in the case of the last pair of legs, where the tympana are only half the lengths of the meropodites. The anterior pair of these legs is the longest, longer than the carapace and equalling the distance between the external orbital angles, distally the legs decrease gradually in length. Both margins of carpo- and propodite are likewise provided with some long hairs. The dactyli are hairy, nearly straight, finely pointed and shorter than the propodites. Between the bases of the first and second, and again between those of the second and third walking leg there is an hairy-edged pouch, as in *Sc. globosa*.

The general colour of the animal is a chestnut-brown, lighter on the legs; the chelae are ivory-white.

This apparently rare species has been originally collected near Hongkong; the "Siboga" caught it in a river at the Bay of Pidjot (Lombok).

Dimensions in mm.:

| | 1 ♂ | 2 ♂ |
|---|---|---|
| Distance between external orbital angles . . | 8.— | 7.— |
| Length of carapace . . . . . | 5.1 | 4.5 |
| Total length of left cheliped. . . . . | — | 11.5 |
| Horizontal length of chela . . . . . | 8.8 | 6.75 |
| Height of palm . . . . . | — | 3.— |
| Length of immobile finger . . . . . | — | 1.75 |
| Length of anterior pair of walking legs. . . | — | 7.— |
| Length of posterior pair of walking legs . . | — | 6.25 |

N° 1 is a specimen measured by KOELBEL, n° 2 is the "Siboga" specimen.

2. *Tympanomerus integer* n. sp. Pl. 3, Fig. 1,

Stat. 250. Kur Island, west of Kei Islands. 1 ♂.

The carapace is much convex in longitudinal direction, but much less so transversely, it has a pentagonal shape, with the side margins converging backward, and is nearly wholly smooth and polished. The regions are scarcely distinct, the gastric-hepatical and cardiac-branchial sulci slightly indicated, but even the cervical groove, though discernible halfway between the level of the external orbital angles and the posterior margin of the carapace, is very faint. Hepatical regions faintly bulging and, like the branchial regions, regularly sloping down laterally; the latter areas are somewhat roughened. Intestinal region very short, but extending along the whole posterior border of the carapace, and transversely striated; a transverse ridge separating this area from the cardiac region is scarcely indicated.

The base of the perpendicularly-deflexed front measures less than one-fourth the distance between the external-orbital angles; the surface is flattened, not excavated; the lateral margins converge forward and pass with obtuse angles into the perfectly straight anterior margin. The supra-orbital border is much sloping, much convex in its middle part, and entire, not beaded; the external orbital angle projects very little, is small and acute and passes nearly rectangularly into the side margins, that in the anterior fourth part converge very little, than more strongly so towards the base of the last legs, so that the somewhat concave posterior margin of the carapace is much shorter than the distance between the external orbital angles. These side margins are unarmed, without any trace of an epibranchial tooth, and there are a few feathered hairs projecting beyond the external orbital angle and inserted on its ventral surface, but none of the club-shaped, sensory (or auditory?) hairs along the anterior part of the side margins, as noted in the preceding species.

The abdomen of the ♂ (fig. 1 *c*) occupies at its base only half the distance between the bases of the posterior legs. The third segment has convex lateral margins and is about twice as long as the two preceding segments together; the fourth segment narrows forward and the fifth is, as usual, much constricted, quadrangular, and less than half as broad as the fourth segment at its base, but both segments are completely fused and I have not found the slightest trace of a suture between them; the length of the two segments together is $1^1/_3$ times

the length of the preceding segment. Contrary to what is found in *Scopimera globosa* and *Tympanomerus ceratophorus*, the lateral margins of the fifth and sixth segment are not diverging, but subparallel; the sixth (penultimate) segment is almost quadrate, as long as broad, and equal in length to the terminal segment, that is semi-circular. The fusing of the fourth and fifth segment, the parallel lateral margins of the constricted part of the abdomen, and the length of this constricted part exceeding that of the proximal enlarged portion, are characters which seem peculiar to this species and are not found in other species of the genus.

The infra-orbital border projects somewhat beyond the supra-orbital one; it is regularly curved, much sloping backward in its outer portion and regularly crenulate throughout, without any notches; parting from the middle of the border a row of similar crenulations runs obliquely towards the antero-lateral angles of the buccal frame, and on the lower wall of the orbit there are a few hairs, irregularly disposed.

The side walls of the body are perpendicular, not sloping outward, wholly covered with large, setiferous tubercles; on the subbranchial regions an oblique groove runs from the base of the posterior leg forward and ventrally to the base of the cheliped.

The eye-stalks are rather elongate, and the bulging cornea reaches beyond the external orbital angle.

As to the antennulae, the antennae, the epistome and the buccal frame I observed no particular difference between the present and the preceding species. The external maxillipeds, (fig. 1 *b*), are similar, but the ischium is not quadrate, but widens distally and is distinctly shorter than the merus, the oblique row of hairs near the anterior margin, which latter is transverse, is better developed; the merus has a broadly-triangular shape, owing to the fact, that both lateral margins are nearly straight and much converging forward; the flagellum is wholly like that of *T. ceratophorus* and there are the same feathered hairs both on the flagellum and at the inner margin of the merus.

The chelipeds are slightly unequal (the left being the larger), and bulky, owing to the size of the chela, that alone in the left cheliped exceeds the length of the carapace, but the meropodite is very short, scarcely projecting beyond the carapace, somewat convex at its outer surface, but flattened at the under and inner face, and provided with a nearly circular, small tympanum, half as long as the length of the meropodite, only at the inner side; the edges are crenulate, and the upper edge, which is much convex, has a small notch at its subdistal end, whereas the outer border ends distally in a prominent tooth, that is itself crenulate. The wrist is short, unarmed, only crenulate along the inner margin, the under surface presents a tuft of hairs near the proximal end of the inner margin and another larger one near the articulation with the palm; the convex upper surface is provided with scale-like rugosities. The palm (fig. 1 *a*) is much inflated, about as high as long, and longer than the fingers; the under border is somewhat convex, curving upward towards the tip of the fixed finger, compressed and crenulate in the middle of its course; the upper border is rounded in its distal portion, but carinate near the carpal articulation; the whole inner surface of the palm is covered with squamiform structures, similar to those on the wrist; along the upper margin the outer surface is very finely granular and the rest of this surface is characteristically sculptured and divided into two

portions, separated by an oblique line, running from the base of the movable finger diagonally downward to the carpal articulation: the upper portion presents the same squamiform, though less regular, markings as already mentioned, the under portion is smooth, ivory-white, continued on the outer surface of the fingers and broken up in its proximal parts into reticulating lines. By this character and also by the general shape of the palm, the chela resembles much that of *T. stapletoni* de Man, but here the reticulation is reduced to dark, not elevated lines and spreads over the entire surface. The fingers are shorter than the palm, thick, conical, gaping at the base, somewhat spooned and hairy at the tip; the fixed finger is straight, very high proximally, but rapidly tapering to the tip, rather sharp-edged at under border, and provided with 6—8 indentations at the cutting margin, but whereas in the right (smaller) chela these indentations are regular, the 3 proximal ones being slightly larger than the 4 that follow, in the left chela there is, parting from the base, firstly an elevated tooth with sloping sides, followed by some 6—7 very small indentations between the larger tooth and the tip; the movable finger is curved, and the proximal two-thirds of its back are covered with the same fine granules that accompany the upper border of the palm, the cutting margin is likewise toothed, but on the finger at the right side there are 12—13 very minute indentations, not differing appreciably in size, whereas the finger of the left cheliped has firstly three rather large, semi-circular indentations, followed by five much smaller ones.

Between the bases of the first and second and also between those of the second and third walking leg there are tufts of silky hairs, that apparently mark two openings into the branchial cavity at either side of the carapace, as has been noted already in the description of the preceding species. All the ambulatory legs are nearly equally long, measuring about the distance between the anterior angles of the carapace, but much shorter than the chelipeds. The meropodites are $2^1/_2$ times as long as broad, narrowing distally, with the anterior distal angle projecting freely and rectangularly, and provided at both surfaces with rather large, oval tympana; carpo- and propodite are together somewhat longer than the meropodite, hairy at both margins; the dactyli finally are conical, acutely pointed, slightly curved and shorter than the propodites.

Like the preceding species, the colour is a chestnut-brown; the chelipeds are lighter coloured.

In the general appearance and in the presence of tympana this species approaches *T. pusillus* (de Haan), but the carapace is comparatively narrower, more convex and not notched behind the external orbital angles, the shape of the abdomen is altogether different, the eye-stalks are longer, the maxillipeds much less operculiform and narrower, and the chelae are much more bulky and differently sculptured.

Dimensions in mm.:

| | |
|---|---|
| Distance between external orbital angles | 5.5 |
| Length of carapace | 4.— |
| Total length of abdomen | 4.25 |
| Length of constricted part of abdomen | 3.— |
| Horizontal length of left chela | 4.75 |
| Height of palm | 3.25 |
| Length of posterior pair of legs | 6.75 |

I presume, that this small specimen, taken at Kur Island near the Kei Islands, has been living in the brook (that is said to be strong in the rainy season [1]) at the west coast of the island, for the species of *Tympanomerus* seem to prefer brackish and fresh water, as far as is known to me, and cannot be called strictly marine.

## Subfam. Macrophthalminae

The members of this group differ widely in outer appearance: the carapace may be very broad, sometimes even twice as broad as long, and the eye-stalks are in some cases greatly elongate, whereas in other instances the carapace is nearly quadrate and the ocular peduncles are shorter than the front, which characters approach those of the Grapsidae. Yet the present subfamily belongs to the Ocypodidae on account of the external maxillipeds being slightly or not at all gaping, and among this latter family they are distinguished by the depressed, generally not globose cephalothorax, the carapace being broader than long, the antennulae transverse and separated by a narrow septum.

Key to the genera:

1. Merus of external maxilliped shorter than ischium; flagellum thick, articulating at antero-external angle of merus. Front deflexed. Eye-stalks generally very long, sometimes reaching far beyond the external orbital angles . . . . . 2

   Merus of external maxilliped as long as, or longer than, ischium, flagellum more slender, at least the two terminal joints. Front deflexed or horizontal . . . . . 4

2. A small gap between external maxilipeds, meri broader than long **Macrophthalmus** Latreille

   A somewhat wider gap between external maxillipeds, meri about as broad as long . . . . . 3

3. Front at anterior margin measuring more than one-third of the distance between the external orbital angles, eyes reaching to these outer angles. Merus of external maxilliped with a deep, diagonal sulcus. . . . . **Hemiplax** Heller [2])

   Front at anterior margin measuring less than one-third of the distance between the external orbital angles, eyes not reaching to these outer angles. Eye-stalks longer than front. . . . **Euplax** H. Milne-Edwards

4. Lateral margins of carapace strongly divergent backward till the level of the bases of the penultimate pair of legs. Chelipeds, even of ♂, extremely weak and small, much shorter than walking legs. Merus of external maxilliped auriculate at its

1) Max Weber. Introduct. et descr. de l'exp. du "Siboga", 1902, p. 117 and p. 29 (with textfig.).

2) This genus contains but a single species, *H. hirtipes* Heller (Reise "Novara", Crust., 1865, p. 40, pl. 4, f. 3) that occurs at New Zealand.

antero-external angle, broader than ischium; exognath not concealed . . . . . **Tylodiplax** de Man

Lateral margins of carapace convex, sometimes toothed. Chelipeds, at least of ♂, stronger. Merus of external maxilliped not auriculate, but regularly arched at outer margin, and strongly notched anteriorly for the reception of the carpus; exognath concealed in outer view . . . . . 5

5. Carapace more or less strongly vaulted. Lateral angles of front rounded . . . . . **Cleistostoma** de Haan

Carapace flattened. Lateral angles of front produced . . . . 6

6. Two obtuse teeth behind external orbital angle; carapace subhexagonal, with a prominent transverse ridge across the cardiac region and running from side to side . . . . . **Camptandrium** Stimpson

Lateral margins of carapace mostly entire or with one tooth, convex; carapace subcircular or roughly transversely-oval. . **Paracleistostoma** de Man

## **Macrophthalmus** Latreille.

1829. *Macrophthalmus* Latreille. Règne an., ed. 2, t. 4, p. 44.

In a recent paper [1]) I have given a synopsis of all the known species of this genus, so that a profound treatment would be useless.

1. *Macrophthalmus telescopicus* (Owen).

Stat. 258. Kei Islands. 1 ♂ juv.

The following records in the literature had previously been overlooked by me:

*Macrophthalmus telescopicus* Ortmann. Denkschr. med.-naturwiss. Gesellsch. Jena, Bd 8, 1894, p. 58 (Thursday Island).

*Macrophthalmus podophthalmus* Lanchester. Proc. Zool. Soc. London, 1900, p. 760 (Singapore).

*Macrophthalmus telescopicus* Rathbun. Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, 1906, p. 834 (Honolulu).

2. *Macrophthalmus graeffei* A. Milne-Edwards.

Stat. 47. Bay of Bima, Sumbawa. 1 ♀.
Stat. 64. Tanah Djampeah, Flores Sea. 1 ♀.

This small species which now must be considered distinct from *M. convexus* Stimpson is represented by two specimens, and one of these has nearly all the legs detached.

1) Zool. Mededeel. Mus. Leiden, v. 1, 1915, p. 149. I regret to say that, besides some omissions in the full litterature upon the subject, I had overlooked a subspecies of *M. dilatatus* viz. *carens* Lanchester (Proc. Zool. Soc. London, 1900, p. 759, pl. 47, f. 11) from Singapore and Malacca. Shortly after the publication of my paper I became acquainted with *M. sandakani* Rathbun (Proc. U. S. Nat. Mus., v. 47, 1914, p. 82) from Sandakan (Borneo), allied to *M. grandidieri* A. Milne-Edwards.

3. *Macrophthalmus convexus* Stimpson.

Stat. 86. Dongala, west coast of Celebes. 1 ♂; 1 ♀.

4. *Macrophthalmus latreillei* Desmarest.

Stat. 47. Bay of Bima, Sumbawa. 1 ♂.

5. *Macrophthalmus definitus* Adams et White.

Stat. 71. Macassar. 1 ♂.

The under surface of the arm of the cheliped is not naked, as I formerly stated [1]) after the description and figure of Miss RATHBUN [2]), but, like the inner and outer face, clad with short, black hairs. The tooth at the cutting margin of the mobile finger is wholly absent in my specimen, and that on the opposite finger is very low, scarcely prominent. The chelae are coloured a reddish-brown and a somewhat darker colour is observed on the polished portions of the carapace. Both margins of the much compressed dactyli of the ambulatory legs are fringed with red hairs.

## Euplax H. Milne-Edwards.

1852. *Euplax* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 18, p. 160.
1858. *Chaenostoma* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, p. 97.

Besides the well known *E. boscii* another species, "*Cleistostoma*" *tridentatum* A. Milne-Edwards seems to belong to this genus, but the shape of the front is altogether different, and the original specimen turned out to be so much injured at the time of its examination by DE MAN that its proper place remains doubtful.

The two species may be distinguished thus:

Front truncate anteriorly. Ischium of external maxilliped without an obliquely-transverse row of hairs. Epibranchial tooth separated from outer orbital angle by a deep emargination. Inner surface of palm and fingers of cheliped clothed with a thick fur of hairs; movable finger with a large quadrangular tooth at the cutting margin. . . . . *E. boscii* (Audouin)

Front triangular anteriorly. Ischium of external maxilliped with an obliquely-transverse row of hairs. Inner surface of palm naked, but gap of fingers filled up with hairs; movable finger without larger tooth at the inner margin, but furnished on the back with a longitudinal row of small tubercles . . . . . *E. tridentata* (A. Milne Edw.) [3])

1) L. c. p. 199.

2) Bull. Mus. comp. Zool. Harvard Coll., Cambridge, Mass., v. 52, 1910, p. 307, pl. 2, f. 1.

3) Journ. Mus. Godeffroy, t. 4, 1873, p. 82. The author includes into the short diagnosis the presence of three acutely-pointed teeth (including outer angle of the orbit) at either side of the carapace. Afterwards DE MAN (Mitt. naturh. Mus. Hamburg, nº 13, 1896, p. 93, pl. 3, f. 5) examined the original specimen (which according to MILNE-EDWARDS was found at Upolu) and placed it, though with hesitation, in the neighbourhood of "*Chaenostoma*" (= *Euplax*).

In later years GRANT and MC CULLOCH (Proc. Linn. Soc. N. S. Wales, v. 31, 1906, p. 21, pl. 1, f. 3) described a new species,

1. *Euplax boscii* (Audouin).

1825. *Macrophthalmus boscii* (Savigny) Audouin. Expl. planches Crust. d. l'Egypte, pl. 2, f. 1.
1843. *Macrophthalmus boscii* Krauss. Südafr. Crust., p. 40, pl. 2, f. 5.
1852. *Euplax boscii* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 18, p. 160.
1852. *Cleistostoma boscii* Dana. U. S. Expl. Exp., Crust., p. 313, pl. 19, f. 3.
1858. *Chaenostoma orientale* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, p. 97.
1858. *Chaenostoma crassimanus*? Stimpson. Ibid. p. 97.
1873. *Euplax (Chaenostoma) boscii* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 281.
1880. *Euplax boscii* de Man. Notes Leyden Mus., v. 2, p. 71.
1884. *Euplax boscii* Miers. Zool. Voy. "Alert", Crust., p. 540.
1886. *Euplax (Chaenostoma) boscii* Miers. Rep. "Challenger", Brachyura, p. 252.
1888. *Euplax boscii* de Man. Arch. Naturgesch., Jahrg. 53, 1., p. 357.
1894. *Euplax boscii* Ortmann. Denkschr. med.-naturw. Gesellsch. Jena, Bd 8, p. 58.
1905. *Euplax boscii* Lenz. Abhandl. Senckenb. Gesellsch., Bd 27, p. 367.
1906. *Euplax (Chaenostoma) boscii* Nobili. Ann. Sc. Nat., (9) t. 4, p. 319.
1907. *Chaenostoma orientale* Stimpson, Smithson. Inst., Miscell., Coll., v. 49, p. 98.
1907. *Chaenostoma crassimanus*? Stimpson. Ibid. p. 98.
1910. *Euplax boscii* Stebbing, Ann. S. A. Mus., v. 6, prt 4, p. 329.

Stat. 86. Dongala, west coast of Celebes. 6 ♂, 7 ♀.
Stat. 131. Karakelang, Talaut Islands. 1 ♂, 3 ♀ (one of the latter with a parasitic Isopod in its left branchial cavity).
Stat. 133. Lirung, Talaut Islands. 3 ♂, 2 ♀ (all juv.).
Stat. 225c. Lucipara Islands, Banda Sea. 2 ♂, 1 ♀ (all juv.).
Stat. 231. Ambon. 2 ♀.
Stat. 250. Kur Island. 2 ♂ juv.

On account of some discrepancy between the original descriptions of H. Milne-Edwards and Dana, Stimpson founded the genus *Chaenostoma* for the reception of Dana's species, which he believed to be distinct from the true "*Macrophthalmus*" *boscii*; for this reason the name *Chaenostoma orientale* was proposed. It is now generally agreed, that in reality this latter is identical with *Euplax boscii*, for the differences in the shape of the external maxillipeds are variable, so that in some specimens the merus is much more distinctly shorter than the ischium than is the case in others.

I am inclined to regard "*Chaenostoma*" *crassimanus* Stimpson likewise as a synonym of the present species. The author does not precisely enumerate its specific characters, but in comparing his description with what may be observed in adult specimens of *Euplax boscii*, the principal differences are, that there is only a slight emargination behind the outer orbital angle, and that the eyes outreach these angles in *E. crassimana*. Stimpson's specimen is very small (only 6—7 mm. across the carapace) and in specimens of this and of smaller size I observed exactly the very differences here enumerated. It was collected, moreover, at the same locality as *E. boscii* (Loo-Choo Islands).

De Man (1888) remarks, that this species attains a breadth of 15 mm. across the carapace, but that a ♀ of only 9 mm. breadth was bearing eggs. The "Siboga"-material

*Metaplax hirsutimana*, which was afterwards by the latter author (Rec. Austral. Mus., v. 9, nº 3, 1913, p. 321), on Miss Rathbun's authority, recognized to be the same as *E. tridentata*. The specimens were taken by the Australian authors in rather great quantities on the mud-flats of Auckland Creek (Queensland) and of the mouth of the Paramatta River (New South Wales).

contains specimens of all size, and among them is one very large ♀ (egg-bearing), the carapace of which measures 21 mm. in maximum breadth, the length being 14.5 mm.

There seem to be two principal colour variations, one being greyish-blue on the carapace and the upper parts of the walking legs, and another in which these parts are chestnut-brown with occasional faint transverse stripes of this colour on the legs. These variations are independent of age and sex. The chelae of the ♂ are always white at the outer surface.

This common species is apparently widely distributed throughout the Indo-Pacific region: it ranges from the Red Sea along the coast of Africa down to the Cape region (Natal), and it occurs in the Indo-Malayan Archipelago, at the Pacific Islands and in the Loo-Choo Archipelago. It is curious, that it seems absent in British India; at least I am not aware of any locality in these regions.

## **Cleistostoma** de Haan.

1835. *Cleistostoma* de Haan (part.). Faun. Japon., Crust. p. 26.
1900. *Clistostoma* Alcock. L. c. p. 372.

In the convex lateral margins of the carapace and in the operculiform external maxillipeds, the merus of which is longer than the ischium (the latter produced at its antero-internal angle) the genus agrees with *Paracleistostoma*, but the anterior margin of the front passes with a regular curve into the lateral margins, and the carapace is much convex in both directions.

Only three species [1]) seem to belong to the genus.

Key to the species:

1. Lateral margins of carapace regularly rounded. Exognath of external maxilliped partly visible in outer view. Meropodites of walking legs very broad, flattened at upper surface . . 2
   Lateral margins of carapace projecting in an obtuse angle at the end of the anterior third of their course. Exognath of external maxilliped entirely concealed in outer view. Meropodites of walking legs slender, not flattened; 2nd and 3d pair each with two hairy tubercles on their anterior margin, 1st and 4th pair with only one . . . . . *Cl. lingulatum* Rathbun [2])
2. Carapace near lateral margins tomentose, as are also the meropodites of the walking legs; margins of meropodites entire . *Cl. dilatatum* de Haan
   Carapace and legs almost naked, meropodites of the latter serrulate at their anterior, spinulous at their posterior margin . *Cl. dotilliforme* Alcock [3])

1) *Cleistostoma leachi* (Audouin) from the Red Sea seems to have, according to DE MAN, its proper place in *Paracleistostoma*. The latter author refers, though hesitatingly, *Cleistostoma tridentatum* A. Milne-Edwards to *Euplax* (see p. 59).

As to *Cleistostoma hirtipes* Jacquinot et Lucas (Voy. "l'Astrolabe" et "la Zélée", t. 6, p. 68, pl. 6, f. 3), it is an obscure species, the generic position of which is doubtful (see also my paper on *Macrophthalmus*, Zool. Med., v. 1, 1915, p. 151, note) and the same may be said of *Cleisto(s)toma edwardsi* Mac Leay (Smith's Ill. Zool. S. Africa, 1838, p. 64).

2) Proc. Biol. Soc. Washington, v. 22, 1909, p. 108. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, nº 4, 1910, p. 323, textfig. 7 and 8. Hab. Gulf of Siam.

3) L. c. p. 373. Ill. Zool. "Investigator", Crust., prt 10, 1902, pl. 64, f. 1. Hab. Karachi.

1. *Cleistostoma dilatatum* de Haan.

1835. *Ocypode (Cleistostoma) dilatata* de Haan. Faun. Japon., Crust. p. 55, pl. 7, f. 3.
1852. *Cleistostoma dilatata* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 18, p. 160.
1895. *Cleistostoma dilatatum* de Man. Zool. Jahrb., Syst., Bd 8, p. 595 (note).

In comparing the only specimen of DE HAAN in the Leiden Museum with the original figure it is evident that this is the very specimen from which DE HAAN took his observations and consequently his drawing is wrong in representing the carapace too long and the front too broad, whereby I only affirm DE MAN's statements; this latter author has furnished us with measurements. DE HAAN is also wrong in stating that the lateral margins of the carapace are entire, not granulate; in reality they are finely and regularly beaded throughout.

This species has much in common with ALCOCK's *Cl. dotilliforme*, but is relatively much broader (maximum breadth of carapace 1,53 times the length in the former and 1.32 in the latter species). In both species the shape of the meropodites of the ambulatory legs is equally foliaceous, and in both the anterior margin of the perfectly flattened and naked upper surface of the meropodites is marked by a granulate row, at least in the case of the first to third pair of legs. From the point where the carapace reaches its maximum breadth in *Cl. dilatatum* a granulate and hairy row runs obliquely backward on the subbranchial region to the bases of the second pair of walking legs, thus marking off dorsally a triangular facet, as Miss RATHBUN describes in *Cl. lingulatum*. The pterygostomial regions are much like that of ALCOCK's species, but in *Cl. dilatatum* there is an additional sulcus, running transversely, immediately below the infra-orbital border, which latter is finely and regularly crenulate, not in the coarse way as represented in *Cl. dotilliforme*. The external maxillipeds (figured by DE HAAN on pl. B) again closely agree with those of the latter species: the merus is large, quadrate, not narrowing anteriorly (as in *Cl. lingulatum*); the sulci on the surface are perfectly alike in both species; the ischium has an obliquely-transverse, very narrow groove close to the anterior margin and the antero-internal angle is produced into an obtuse prominence; the exognath is only partly exposed in outer view. The eye-stalks are thick, slightly shorter than the breadth of the front between the bases of these eye-stalks.

## Paracleistostoma de Man.

1895. *Paracleistostoma* de Man. Zool. Jahrb., Syst., Bd 8, p. 580.

Four species belong to this genus, and a fifth one has been added by the "Siboga" expediton.

Key to the species:

1. Palm of cheliped of ♂ with a superior and an inferior longitudinal granulate crest. Ambulatory legs covered with a close fur of long, yellow hairs. . . . . *P. eriophorum* Nobili [1])

Palm of cheliped smooth, without crests. Ambulatory legs normally hairy . . . . . 2

1) Boll. Mus. Torino, t. 18, 1903, n° 447, p. 23. Hab. Buntal (Borneo).

2. Branchial and anterior cardiac region with a continuous, transverse ridge across the carapace. Epigastric lobes distinct, sharp . . *P. cristatum* de Man [1])

Carapace smooth, without transverse ridge. Epigastric lobes indistinct, not sharp . . . . . 3

3. Lateral margins of carapace with a prominent tooth, a little anterior to the middle of their course, anterior part concave, external orbital angle produced. Walking legs long, meropodites of 2d and 3d pair very much elongate. . . . . *P. dentatum* n. sp.

Lateral margins of carapace regularly arched, not toothed. Walking legs not elongate . . . . . 4

4. Anterior margin of front 0.3 of maximum breadth of carapace. 5th segment of abdomen of ♂ about as broad as long, with parallel lateral margins. Movable finger of cheliped curved . . *P. leachii* (Audouin) [2])

Anterior margin of front 0.2 of maximum breadth of carapace. 5th segment of abdomen of ♂ fused with the preceding and with convergent lateral margins. Movable finger of cheliped straight, fingers widely gaping . . . . . *P. depressum* de Man [3])

1. *Paracleistostoma dentatum* n. sp. Pl. 3, Fig. 2.

Stat. 66. Saleyer Island, near south point of Celebes. Depth varying from 9– 34 M. 1 ♀.

This small species is at once distinguished by the prominent tooth on the sides of the carapace, and by the elongate shape of the meropodites of the walking legs, especially in the case of the third pair.

The carapace is not so much flattened as in *P. depressum* (the only species with which I could compare it), uneven in the middle parts and sloping towards the sides, especially on the outer parts of the branchial regions; in longitudinal direction it is rather much vaulted. The various regions are not very distinct, and the whole surface is hairless, with scattered punctae (only visible by a rather strong magnification), except on the gastric and cardiac area. The cervical groove, which is found anterior to a line connecting the lateral teeth of the carapace and so lying nearer to the supra-orbital border than to the posterior margin of the carapace, is short, concave forward; the gastric region is faintly or not at all defined laterally, but, so far as can be observed, much narrower than the very broad cardiac region. At the base of the front the two epigastric lobes are visible as sharp, transverse ridges, scarcely separated one from another, and immediately behind the lateral part of each there is a small and shallow depression on the epigastric region. The cardiac area is much broader than the gastric region, owing to its lateral parts being auriculate in their posterior half; its length in

1) *Cleistostoma dilatatum* Ortmann nec de Haan. Zool. Jahrb., Syst., Bd 7, 1894, p. 733. Hab. Japan. De Man (Zool. Jahrb., Syst., Bd 8, 1895, p. 590) afterwards studied the very specimens of Ortmann.

2) For literature on this Red Sea species see Nobili: Ann. Sc. Nat. (9) t. 4, 1906, p. 316, for description: de Man, Mitt. naturhist. Mus. Hamburg, nº 13, 1896, p. 90.

3) De Man, Zool. Jahrb., Syst., Bd 8, 1895, p. 581, pl. 14, f. 13. Hab. Penang and Pontianak.

the median line is only one-third of its maximum breadth, and anterior and posterior groove are concave, with the convexity turned towards each other. An intestinal region is wanting. Hepatic and branchial regions are not separated one from another, on the hepatic region there is a small tubercle, near the lateral margin of the carapace and behind the external orbital angle, and on the branchial regions there is a pair of similar tubercles, one behind the other, and situated posterior to the level of the lateral teeth; parting from these tubercles the carapace is strongly declivous towards the margins. Quite near the branchio-cardiac sulci a small depression is found on either side of the carapace.

The front is narrow, measuring between the bases of the eye-stalks only one-fifth of the distance between the external orbital angles, vertically deflexed; the anterior margin is convex, but concave near the lateral angles, which are produced into rather long points, and it is this character that decides the systematic place of the new species (fig. 2*a*); the upper surface of the front, before the epigastric lobes, is excavated; the lateral margins are decidedly concave, somewhat turned upward and thickened, and continued without transition into the sigmoid-shaped, wholly transverse, and finely beaded supra-orbital borders, that terminate in rather long, triangular external orbital angles; the distance between these angles is $1^1/_2$ times the total length of the carapace. Behind the anterior angles the lateral margins are strongly concave in upper view all along the anterior half of their course, finally terminating in a strong, triangular tooth at either side of the carapace; this tooth is obtuse and directed outward. The posterior halves of the lateral margins of the carapace are converging distally and the perfectly straight posterior margin is nearly as long as the distance between the anterior angles, and much shorter than that between the lateral teeth.

The eye-stalks are $1^3/_4$ times the breadth of the front and do not reach the outer angle of the orbit; the lower border of the latter is visible in dorsal view and entire, not notched, but finely crenulate throughout, the crenulations being intermingled with short hairs; the outer portion much slopes backward and disappears beneath the external orbital angle.

The antennulae are lodged immediately beneath the anterior margin of the front; the angles of the latter nearly touch the antero-internal angle of the basal joint of the antennae.

Epistome rather short, but inferior border produced into a triangular tooth. Pterygostomial regions separated from subhepatical ones by a shallow sulcus and crossed by a hairy ridge that is continued backward as far as the bases of the penultimate pair of legs.

The buccal frame is somewhat wider posteriorly than anteriorly. The external maxillipeds (fig. 2*c*) are quadrate, completely closing the buccal cavern, as in *Cleistostoma*. Ischium shorter than merus, with perfectly parallel lateral margins; posterior and anterior margin are somewhat oblique and likewise parallel; the internal angle of the latter is slightly produced, though not quite so distinct as in the preceding genus; breadth of ischium decidedly exceeding its length. Merus likewise broader than long; the posterior portion of the external margin is straight, in a line with that of the ischium, but the anterior part strongly curves inwards to meet the carpus; the internal margin is very short, convex, and excavated for the reception of the carpus, which latter is as long as, and twice as broad as, the two next segments. Flagellum very little hairy. The surface of both ischium and merus is perfectly smooth, without

hairs or grooves, and even the transverse row near the suture, on the ischium, is entirely wanting. The exognath is very little exposed.

The very broad abdomen of the ♀ consists of 7 separate segments; it entirely covers the sternum and the numerous eggs concealed under it measure about 0.2 mm.

The chelipeds of the ♀ (fig. 2*b*) are as long as the distance between the external orbital angles, but exceedingly weak, rod-like; the meropodite projects beyond the carapace, is about as long as the chela and twice as long as the carpopodite; both arm and wrist are covered with small granules, but otherwise quite unarmed; the palm is very low, its height being only one-third of its length, and somewhat longer than the straight, slender fingers, the inner margins of which are entire; fingers and palm are fringed at both margins with long hairs.

Of the walking legs the penultimate pair is the longest, nearly twice the distance between the anterior angles of the carapace; the last pair is the shortest. Half the length of the legs is due to the great elongation of the slender meropodite, which at its maximum breadth (in its anterior third) is only one-fourth as broad as long, quite unarmed, not depressed and of a frosted appearance owing to the presence of minute, squamiform granules. Carpo- and propodite are smooth, fringed with long hairs. The dactyli are straight, much compressed, shorter than the propodites and likewise fringed; those of the last pair are slightly curved backward.

The animal is of a uniform ivory-white colour.

Dimensions in mm.:

| | |
|---|---|
| Distance between external orbital angles | 5.— |
| Length of carapace | 3.25 |
| Distance between lateral teeth of carapace | 6.25 |
| Posterior margin of carapace | 4.5 |
| Length of meropodite of penultimate pair of legs | 4.5 |
| Breadth of meropodite of penultimate pair of legs | 1.— |
| Breadth of front between eye-stalks | 1.— |
| Length of eye-stalk | 1.75 |
| Length of cheliped | 5.— |

## **Camptandrium** Stimpson.

1858. *Camptandrium* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 107.

### 1. *Camptandrium sexdentatum* Stimpson. Pl. 5, Fig. 3.

1858. *Camptandrium sexdentatum* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 107.
1907. *Camptandrium sexdentatum* Stimpson. Smithson. Inst., Miscell. Coll., v. 49, p. 138, pl. 17, f. 4.

Among the undetermined material of Crustacea in the Leiden Museum I found to my great surprise a ♂ of this remarkable and apparently extremely rare species, that has never been found again, since its having been dredged by Stimpson from a depth of a few fathoms in bays near Hongkong. My specimen had been brought home by Dr. Buitendijk from the Bay of Batavia, in 1909. Stimpson's figure is very good and enables one at once to recognize the animal, but not all the details are shown, neither are these exhaustively spoken of in the description.

The carapace is markedly hexagonal, flattened, but divided into a large anterior portion and a much smaller posterior one by way of a prominent transverse crest, extending nearly from side to side, most conspicuous across the cardiac region and gradually disappearing laterally. On either side of this obtuse crest [1]) the surface slopes forward or backward, but is rather uneven; the external branchial regions are, as usual, strongly declivous, and the whole surface of the carapace shows a very short fur, which, if rubbed off, turns out to conceal a minute granulation. A short cervical groove, concave forward, separates the small gastric region from the cardiac area; the latter itself is not defined posteriorly but passes into the somewhat bulging intestinal region. The mesogastric region presents some lobules anteriorly, and laterally, on the hepatic regions, there are on either side two obliquely-disposed verrucosities, forming a kind of interrupted row from the mesogastric region towards the posterior lateral tooth of the carapace; similar, but rounded and longitudinally-arranged structures are found at either side of the gastric region, and in the angle of the branchio-cardiac grooves. Hepatic regions depressed; postfrontal lobes two in number, prominent, but not sharpened anteriorly, placed on the level of the supra-orbital margin.

The front is remarkably narrow, about one-third of the distance between the orbital angles, obliquely-deflexed, with the margins thickened and granular; the anterior border is divided into two lobules by the same longitudinal groove that separates the post-frontal lobes; the lateral margins are concave, converging forward, and the anterior angles are pronounced, acuminate. The supra-orbital border is perfectly transverse, save the external third part, that is deeply excavate and rises towards the subrectangular outer orbital tooth. The eye-stalks are comparatively long and slender, but somewhat shorter than the width of the front, and the cornea does not reach to the outer orbital angle. The lateral margins of the carapace are separable into two parts, the anterior ones being somewhat the shorter, markedly diverging backward and divided into three obtuse teeth, including the external orbital angle, the anterior two teeth directed forward and of nearly the same shape and size, the posterior tooth being shorter and directed straightly outward; between the tips of these posterior teeth the carapace reaches its maximum breadth and posteriorly the lateral margins are somewhat convex but rapidly converging backward, so that the thickened posterior margin is distinctly shorter than the distance between the outer orbital angles.

The antennulae are folded obliquely beneath the front and separated by a triangular, narrow plate (fig. 3 *a*); the antennae are placed in the orbital hiatus, as the inner suborbital tooth does not join the front, the basal joint of the antenna is broad and quadrate, the two following much narrower but of the same length, and the flagellum is rather long, outreaching the eye-stalk. Suborbital border convex and minutely crenulate in its inner two-thirds, concave and finely granular in its external part, that is very little marked; pterygostomial regions granular, with a longitudinal hairy groove; side walls of the body perpendicular and hairy. Epistome short, but distinct; anterior margin of buccal cavern with a strongly prominent ridge

1) STIMPSON speaks in his diagnosis of the genus of three or four interrupted transverse ridges on the carapace, but his drawing does not essentially differ from the figure here given.

in the median line, lateral margins raised, convex, but not diverging distally. External maxillipeds markedly operculate, scarcely gaping; ischium with the lateral margins somewhat concave and the anterior inner angle produced, surface smooth, except for a row of very small granules immediately behind the suture between ischium and merus; this suture is slightly oblique and somewhat concave forward, but may still be called transverse; merus longer and broader than ischium, inner margin short and straight, anterior margin deeply notched in the middle for the insertion of the carpus, the outer part of this margin reaching farther forward than the inner portion and passing with a much convex outline into the long external margin of the merus, the surface is naked, but provided with a few scattered granules in the middle. Sternum broad; its anterior margin between the bases of the chelipeds rising into a sharp ridge, forming the posterior boundary of the buccal cavern.

Abdomen of ♂ (fig. 3*c*) by far not filling up the space between the bases of the posterior legs; second segment longer than, but as broad as, the preceding, third, fourth and fifth segment fused, so as to leave scarcely any trace of sutures, but the sinuses in the margins still provide indications of separation; third segment narrower than the second, and fourth again narrower than the preceding; between the fourth and fifth segment the abdomen is markedly constricted and then widens again towards the sixth or penultimate segment, the lateral margins of which are convex and slightly converging forward, so that the base of the segment is somewhat longer than the anterior margin; the terminal segment finally is semi-circular, the width at the base slightly exceeding the length, which latter is somewhat larger than that of the preceding segment. All the still existing sutures between the segments are peculiarly wavy, and the abdomen reaches upward till nearly the elevated ridge, that anteriorly defines the sternum.

The chelipeds (fig. 3*b*) are equal; their length equals the maximum breadth of the carapace; meropodite short, slightly projecting beyond the carapace, unarmed, but granular; outer surface with transverse rugosities, upper and especially outer border fringed with rather long hairs; carpopodite small, with the upper surface granular and the inner angle rounded, between this inner angle and the palmar joint with a row of hairs; chela elongate, palm about $1^1/_2$ times the length of the fingers and longer than high, with the upper margin rounded, and the whole surface naked and minutely granular; fingers gaping, not compressed, spooned [1]) and somewhat hairy at the tip, cutting margins finely crenulate, but the movable finger presents near the base a large, oblique tooth, increasing in height distally and itself finely crenulate at the free margin.

The ambulatory legs are rather slender; the second pair is the longest and about $1^1/_2$ times the greatest breadth of the carapace, the third pair is only very slightly shorter, and the first and fourth pairs are again shorter and subequal in length. All the legs are hairy at the surface, especially towards the margins, and the latter themselves are heavily fringed with long hairs; the meropodites are $3^1/_2$ times as long as broad and there is a rectangular prominence near the distal end of the anterior margin, which projection is even acuminate in

1) This character is, according to STIMPSON, still more pronounced in the ♀, in which the chelae resemble those of the same sex in *Uca*.

the case of the second pair of legs; carpo- and propodite are more slender than the meropodite and together as long as this meropodite; the dactylus is markedly compressed, in the same way as in *Ocypoda*, and fringed with hairs, that rapidly decrease in length from base to tip, in all the legs the dactyli are about two-thirds of the length of the propodite and slightly curved, but in the case of the posterior pair the dactyli are perfectly straight.

Stimpson established a new family Camptandriidae for the reception of his genus, as he observed quite well, that the latter could not be included into the Grapsidae, though apparently allied to *Cyrtograpsus* Dana. Alcock [1]), though with a query, referred *Camptandrium* to the Goneplacidae. I am of opinion, that the genus does not belong to either of these families, but that it evidently is one of the Ocypodidae and that its natural place is among the *Macrophthalminae*. This view is corroborated by the relative narrowness of the front, by the slender eye-stalks, and especially by the plate-like, scarcely gaping external maxillipeds, the merus of which is as large as, or even slightly larger than, the ischium; the much compressed shape of the dactyli of the ambulatory legs likewise points to the Ocypodidae. The affinity to the *Macrophthalminae* is proved by the absence of hairy tufts between the bases of the walking legs, by the narrow nasal plate separating the oblique antennulae, and by the width of the front, that is broader than in *Ocypodinae* or *Mictyrinae*. Its nearest ally is undoubtedly the genus *Paracleistostoma* de Man, as the lateral angles of the front are produced, and the abdomen of the ♂ is likewise constricted between the fourth and fifth segment, and these segments, together with the third, are completely fused [2]); besides, the abdomen only occupies slightly more than two-thirds of the interspace between the bases of the posterior legs and reaches upward till nearly the posterior boundary of the buccal cavern, and the movable finger of the chela bears a subquadrate tooth near the base: all these facts point in the same direction. *Camptandrium* even bears a distant resemblance to the new species *P. dentatum* (see p. 63, pl. 3, f. 2) in the toothing of the carapace, but it is needless here to enumerate the many points of difference that warrant the maintaining of *Camptandrium* as quite a distinct genus.

As to Miss Rathbun's new species, *C. paludicola* [3]), it is very difficult to decide anything about its true systematic position, as only one young ♀ has been obtained. After the information we now possess about *Camptandrium* it is, however, evident, that it does not belong to this genus and I venture to suggest, that it really is to be referred to *Cyrtograpsus* Dana [4]), which view is supported by the peculiar toothing of the carapace [5]) and by the shape of the external maxillipeds, the merus of which is distinctly shorter and smaller than the ischium and auriculate at its antero-external angle. In any case this species certainly belongs to the Grapsidae.

1) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 292.

2) Compare the details of *Paracleistostoma depressum* de Man in Zool. Jahrb. Syst., Bd 8, 1895, pl. 14, f. 13*c—d*.

3) Proc. Biol. Soc. Washington, v. 22, 1909, p. 109. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n° 4, p. 326, textfig. 9. Hab. Gulf of Siam, in mangrove swamps.

4) Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 250.

5) Compare the figures of *C. angulatus* Dana in U. S. Expl. Exp., Crust., 1852, p. 352, pl. 22, f. 6. Hab. Rio Negro (Patagonia).

Dimensions in mm. [1]):

| | |
|---|---|
| Distance between external orbital angles | 6.9 |
| Width between posterior epibranchial teeth | 10.1 |
| Width of front between eye-stalks | 2·4 |
| Length of carapace | 8.0 |
| Length of posterior margin of carapace | 5.1 |
| Length of cheliped | 10.25 |
| Horizontal length of chela | 4·75 |
| Length of palm | 3.0 |
| Height of palm | 2.15 |
| Breadth of abdomen at base | 3.1 |
| Breadth of posterior margin of penultimate segment of abdomen | 1.8 |
| Length of penultimate segment of abdomen | 1.1 |
| Breadth of posterior margin of terminal segment of abdomen | 1.5 |
| Length of terminal segment of abdomen | 1.3 |
| Length of 2d pair of walking legs | 15.3 |
| Length of meropodite of 2d pair | 6.1 |
| Breadth of meropodite of 2d pair | 1.8 |
| Length of carpo- and propodite of 2d pair | 6.3 |
| Length of dactylus of 2d pair | 2.0 |

The largest specimen measured by STIMPSON (a ♀) was of about the size of the animal now described.

## **Tylodiplax** de Man.

1895. *Tylodiplax* de Man. Zool. Jahrb., Syst., Bd 8, p. 598.

The lateral margins of the carapace are strongly divergent backward and unarmed, the chelipeds, even in the ♂, exceedingly small and weak, and the maxillipeds, the exognath of which is wholly exposed, are auriculate at the antero-external angle of the merus [2]).

Two species are contained in the genus, but the systematic place of one of these is doubtful.

Key to the species:

Front obliquely-deflexed. Carapace with two prominent tubercles on the cardiac region, and two less prominent ones at the anterior angles of the intestinal region. Chelipeds of ♂ excessively small and weak . . . . . *T. tetratylophorus* de Man [3])

Front not deflexed. Carapace somewhat hairy at the margins, but without the prominent tubercles. Chelipeds of ♂ somewhat larger, but shorter than most of the walking legs . . . . . *T. indica* Alcock [4])

1) Measured under microscope.

2) DE MAN states that this genus is distinguished from *Cleistostoma* by having the merus of the external maxilliped larger (longer) than the ischium, but this character is observed quite as well in the latter genus.

3) Zool. Jahrb., Syst., Bd 8, 1895, p. 599, pl. 14, f. 15. Hab. Penang.

4) L. c. p. 374. Ill. Zool. "Investigator", Crust. prt 10, pl. 64, f. 2. ALCOCK doubts whether *Tylodiplax* should not be united with *Paracleistostoma* or *Cleistostoma*. The development of the chelipeds in the immature ♂ (found at Karachi) renders it uncertain whether in the adult form the cheliped should not attain the normal size of that the other named genera, but I am of opinion, that even then the shape of the external maxillipeds would justify the maintenance of *Tylodiplax*.

# GRAPSIDAE.

This large family contains some widely spread genera and above all the true *Grapsi*, that are most conspicuous on all sandy and rocky beaches in the tropics. The carapace is squarish, the front broad and much exceeding the length of the short and thick eye-stalks, the external maxillipeds are widely gaping, the chelae are very often provided with a tuft of hairs on the palm or in the cleft of the fingers.

Like the Ocypodidae all species are essentially littoral, keeping quite close to the shore, in shallow water, or haunting the beach, where they are found running about with marvellous speed and throwing themselves headlong into the water when pursued. As a rule they do not burrow but shelter themselves under stones. Some species keep to estuaries, to the mouth of rivers or even to entirely fresh water; one genus (*Geograpsus*) may be called almost terrestrial; on the other hand such genera as *Planes* and *Varuna* (especially the former) are wont to cling to floating objects and may be carried along all throughout tropical and subtropical seas: as is well known *Planes* is even a common inhabitant of the Sargassum weed.

The family is subdivided into four subfamilies: *Grapsinae*, *Sesarminae*, *Varuninae* and *Plagusiinae*, for the discrimination of which a reference to ALCOCK's [1]) or BORRADAILE's [2]) paper is sufficient.

## Subfam. GRAPSINAE.

The four Indo-Pacific genera are well discriminated by ALCOCK's most useful memoir and there is to need to repeat his key to *Grapsus*, *Geograpsus*, *Metopograpsus* and *Pachygrapsus* [3]).

### **Grapsus** Lamarck.

1801. *Grapsus* Lamarck. Syst. An. sans vert., p. 150.

Subsequent writers frequently have included into *Grapsus* several species which really are to be referred to other genera. The true *Grapsi* are separable into only a few species, two of which are again subdivided into subspecies.

1) Journ. As. Soc. Bengal, v. 69, prt. 2, 1900, p. 389—390.

2) Ann. Mag. Nat. Hist. (7) v. 19, 1907, p. 485. KINGSLEY (Proc. Acad. Nat. Sc. Philadelphia, 1880, p. 187) has given most useful key to the genera then known; his analytical tables of the genera are unfortunately often unreliable.

3) *Leptograpsus* H. Milne-Edwards with apparently one species only, *L. variegatus* (Fabricius) (KINGSLEY, l. c. p. 196. ORTMANN Zool. Jahrb., Syst., Bd 7, 1894 p. 707) is not included; for the species, though occasionally recorded from Australia, Tasmania and Chile is chiefly a West American one.

Key to the species:

1. Lateral margins of carapace arched. . . . . 2
   Lateral margins of carapace subparallel . . . . . *Gr. intermedius* de Man [1])
2. Front much deflexed and high (height half the breadth between eye-stalks). Epistome long. Tooth at inner angle of orbit obtuse. Walking legs, at least propodites, elongate . . . . . *Gr. maculatus* Catesby [2])
   Front less deflexed and less high (height always less than half the breadth between eye-stalks). Epistome shorter. Tooth at inner angle of orbit subacute, keeled. Walking legs shorter. *G. strigosus* (Herbst)

1. *Grapsus strigosus* Herbst. Pl. 4, Fig. 1 and 4.

Literature and description: ALCOCK: l. c. p. 393 [3]).

Stat. 34. Labuan Pandan, Lombok. 2 ♂ (1 juv.), 1 ♀.
Stat. 51. Madura Bay, Molo Strait. 1 ♀.
Stat. 60. Haingsisi, Samau Island near Timor. 1 ♂.
Stat. 61a. Adonare Island, east of Flores. 1 ♀.
Stat. 231. Ambon. 2 ♀.

The specimens are of moderate or small size.

Though the differences between the present species and *Grapsus maculatus* are well enumerated by ALCOCK, the examination of a large series of specimens of the Leiden Museum induced me to sum up the following points, for the help of those who have no opportunity to compare both species.

| | *Grapsus maculatus.* | *Grapsus strigosus.* |
|---|---|---|
| Breadth of front | 36—37% of distance betw. ext. orb. angles | 39—40% of the said distance |
| Height of front | One-half of its breadth betw. eye-stalk | Less than one-half of its breadth betw. eye-stalks |
| Surface of front | With two symmetrically-placed larger tubercles | Without such tubercles |
| Inner suborbital tooth | Obtuse | Subacute, keeled |
| Length of epistome | One-third of its breadth | Scarcely one-fourth of its breadth |
| Meropodites of walking legs | More than twice as long as broad | Twice as long as broad |
| Length of carpo- + propodite of penultimate pair of legs | Distinctly longer than meropodite of this leg [4]) | Equal to or slightly exceeding length of meropodite [5]) |
| Length of first pair of walking legs | Much shorter than that of last pair | About equal to that of last pair |
| Distal part of posterior margin of meropodite of last pair | Usually not dentate, obscurely so in very large individuals | Dentate as in the preceding legs |

1) Arch. Naturgesch., Jahrg. 53, 1. p. 365, pl. 16. f. 1. Hab. Noordwachter Island (Bay of Batavia). Though this species is indeed closely related to *Gr. strigosus* it is apparently a distinct species, that does not at all attain the large size of HERBST's species (breadth of carapace at most about 20 mm.).

2) Literature and description: ALCOCK, l. c. p. 392. This species has often been called *Grapsus grapsus* owing to its having been designated by LINNÉ under the name *Cancer grapsus*. Distributed throughout all tropical regions, but chiefly Atlantic.

3) To the synonyms enumerated by ALCOCK *Grapsus longipes* Stimpson should be added (Miss RATHBUN in footnote of STIMPSON's memoir (Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 119). This species is wholly Indo-Pacific.

4) See Pl. 4, Fig. 2.

5) See Pl. 4, Fig. 1.

As to some other points of difference (branchial grooves on carapace, shape of tooth at inner angle of wrist, absence or presence of longitudinal median ridge on palm of cheliped), I cannot find them really constant.

Each of the two species were split up by H. MILNE-EDWARDS [1]) into a number of "species", that seem to have been founded on merely individual variations and have been withdrawn by subsequent authors. Yet each of both species seems to offer constant varieties.

As to *Grapsus maculatus*, that is cosmopolitically distributed throughout the warmer regions, Miss. RATHBUN remarks [2]): "The common rock crab of the tropics, *Grapsus grapsus*, is separable into two forms, one in which the lobe on the wrist is very broad and terminates in a short point (*G. grapsus* typical), and one in which the same lobe is narrow and terminates in a long narrow spine (*tenuicristatus* Herbst). The former inhabits the coasts of America, including the outlying islands, such as the Galapagos, and also the eastern shores and islands of the Atlantic Ocean; the latter is restricted to the oriental region". I can confirm this statement, though it must be owned, that the difference in shape of the inner angle of the wrist is scarcely perceptible in some cases, where specimens of either Atlantic or oriental origin are compared.

It seems to be of more importance, that both *Gr. maculatus* and *Gr. strigosus* possess a slender-legged form, named resp. *Gr. gracilipes* H. Milne-Edwards and *Gr. longitarsis* Dana, that have been given the rank of separate species.

In order to elucidate the difference between *Gr. maculatus* and its subspecies *gracilipes*, the penultimate leg of both is figured on Pl. 4, Fig. 2 and 3. Both are represented natural size; the breadth of the carapace in the specimen of *Gr. maculatus* is 46 mm., that of *Gr. gracilipes* [3]) is much less, 37 mm. Nevertheless we may remark, that the length of the carpo- and propodite together is nearly the same in both specimens, and that in *Gr. gracilipes* the breadth of the propodite is one-fifth its length measured in the median line, in typical *Gr. maculatus* more than one-fourth its length.

As to *Gr. longitarsis*, Miss RATHBUN who had occasion to examine the typical specimen of DANA, first regarded [4]) it as a subspecies of *Gr. strigosus*, that differs in somewhat more elongate propodites, in meropodites narrowing more distinctly, in the more enlarged abdomen of the ♀ (in the ♂ the abdomen is equilaterally triangular) and in the front being less advanced. Afterwards [5]) this author raised the subspecies to the rank of a separate species and added some more characters, the most important of these being that the front is wider than in *Grapsus strigosus*.

1) Ann. Sc. Nat. (3) t. 20, 1853, p. 167—170.

2) Bull. U. S. Fish Comm. for 1903, v. 23 prt 3, 1906, p. 838.

3) This is the very specimen mentioned by DE MAN (Notes Leyden Mus., v. 5, 1883, p. 159). This author afterwards had the opportunity to examine another specimen from Ternate and to compare it with the typical *gracilipes* of MILNE-EDWARDS (Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, 1902, p. 502). From the measurements taken (the Ternate specimen is only 1 mm. broader than that of the Leiden Museum) we must conclude, that the length of the propodite of the penultimate pair of legs varies somewhat individually, for in the Ternate specimen it is 25 mm., in my specimen 23.5 mm.).

4) L. c. p. 838, textfig. 4, pl. 8, f. 1. *Grapsus subquadratus* Stimpson (Proc. Acad. Nat. Sc. Philadelphia, 1858, p. 103; Smithson. Inst., Misc. Coll., v. 49, 1907, p. 119, pl. 16, f. 4) is added as a synonym.

5) Mem. Mus. comp. Zool. Harvard Coll., v. 35, n° 2, 1907, p. 28.

There are two small *Grapsi* in the "Siboga"-collection, both ♂, one collected at Stat. 19 (Labuan Tring, west coast of Lombok), the other at Stat. 277 (Dammer Island, Banda Sea). The first named, though the smaller one, is more perfect and has been figured on Pl. 4, Fig. 4. I regard, though with some doubt, these specimens as *Grapsus longitarsis*. In the original specimen of DANA the legs are apparently wrongly figured [1]), the dactyli being represented stunted and as long as the short propodites.

The lateral margins of the carapace in my specimens are nearly parallel, especially in the smaller individual. By this character they approach *Grapsus intermedius*, in which, according to DE MAN, the ambulatory legs are comparatively much shorter. On the whole the carapace and especially the breadth and shape of the front is wholly like that of *Grapsus strigosus*, but the walking legs are much more elongate; the difference in size between the first and fourth pair is distinctly pronounced, and the meropodites are $2^1/_2$ times as long as broad and narrowing distally. The length of the penultimate pair of legs is more than $2^1/_2$ times the length of the carapace (twice its maximum breadth), whereas in typical specimens (of slightly larger size) of *Grapsus strigosus* this pair of legs is scarcely twice the said length; the carpo- and propodite together are nearly equal to the maximum breadth of the carapace, and the propodite is slender, $4—4^1/_2$ times as long as broad, and distinctly longer than the dactylus. The upper margins of the meropodites in the first to third pair present a few movable spines, which I do not observe in somewhat larger individuals of *Grapsus strigosus*. Mero-, carpo- and propodite of the legs are crossed by more or less distinct transverse stripes of a brown colour; in the smaller individual each joint has two of these stripes, in the larger they are broader, almost confluent, and the meropodites are irregularly marbled. The abdomen of the ♂ has the broad, equilaterally-triangular shape, described by Miss RATHBUN, but the same is observed in young specimens of genuine *Grapsus strigosus*. A hairy-edged cavity between the bases of the second and third ambulatory leg is distinctly seen.

The specimens may be characterized by having the carapace of *Grapsus strigosus* and the legs of *Grapsus maculatus* and for this reason I refer them to *Grapsus longitarsis*. Miss RATHBUN states, that in this species (which I prefer to maintain as a subspecies of *Grapsus strigosus*) the front is wider, though she does not give us exact measurements to verify this [2]), and in my larger specimen the breadth of the front is 40 °/₀, in the smaller individual even 43 °/₀ of the maximum breadth of the carapace (in typical *Grapsus strigosus* 39—40 °/₀).

Dimensions in mm.:

| | 1 | 2 |
|---|---|---|
| Breadth of carapace | 17.3 | 9.7 |
| Distance between external orbital angles | 14.1 | 8.8 |
| Length of carapace | 14.75 | 8.1 |
| Breadth of front between eye-stalks | 7.— | 4.2 |
| Length of meropodite of penultimate pair of legs | 12.3 | 7.7 |
| Breadth of meropodite of penultimate pair of legs | 5.7 | 3.1 |

1) U.S. Expl. Exp., Crust., 1852, pl. 21, f. 4*a*.

2) Neither are such measurements given of the large specimen from the Indian Ocean (Egmont Reef) in her paper on the marine Brachyura of the Percy Sladen Trust Expedition (Transact. Linn. Soc. London (2) v. 14, 1911, p. 241.

| | | 1 | 2 |
|---|---|---|---|
| Length of carpo- and propodite together | of penultimate pair of legs | 15.4 | 9.5 |
| Length of propodite in the median line | | 8.8 | 5.5 |
| Breadth of propodite | | 2.2 | 1.3 |
| Length of dactylus | | 6.— | 3.3 |

In typical *Grapsus strigosus* and in *Grapsus longitarsis* the length of the carapace exceeds the distance between the outer orbital angles, but in the smaller "Siboga"-specimen the reverse is the case, owing to the carapace being scarcely narrowed anteriorly.

## Geograpsus Stimpson.

1858. *Geograpsus* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 101.

The genus is distinguished from *Grapsus* by straight or nearly straight lateral margins of the carapace, by a much less defined epistome, and by more bulky chelipeds, the fingers of which are not spoon-shaped but acute at the tip.

The habits of the members of *Geograpsus* are almost like those of the true landcrabs (Gecarcinidae).

Thanks to DE MAN's researches, it is now easy to discriminate the Indo-Pacific species by means of the following key [1]):

1. Lateral margins of carapace distinctly converging backward behind epibranchial teeth, and obtuse, not keeled in their posterior half. Inferior orbital border, between external angle and fissure, entire, not dentate. . . . . *G. grayi* (H. Milne-Edwards) [2])

   Lateral margins of carapace parallel or feebly diverging backward, sharply keeled throughout . . . . . 2

2. Cardiac and intestinal regions of carapace nearly wholly smooth, with only a few transverse lines immediately behind cervical groove. Breadth of meropodites of last pair of legs more than half their length; posterior margin of preceding ambulatory legs distinctly dentate at distal extremity . . . . . *G. lividus* (H. Milne-Edwards) subsp. *stormi* de Man

   Cardiac and intestinal regions of carapace covered with irregular transverse lines; grooves on branchial regions deeply cut and long. Breadth of meropodites of last pair of legs not more than half their length; posterior margin of preceding ambulatory legs not at all, or very indistinctly; dentate at distal extremity *G. crinipes* Dana [3])

1) I have not been able of including one species into this key, *Geograpsus minikoiensis* Borradaile (Faun. Geogr. Maldives etc., v. 1, 1901, p. 66, f. 12 and Transact. Linn. Soc. London (2) v. 12, 1907, p. 64 from Minikoi and the Seychelles; this species is much too little known.

2) Literature and description: DE MAN, Zool. Jahrb., Syst., Bd 9, 1895, p. 80 and ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 395. Throughout Indo-Pacific region.

3) Literature and description: DE MAN, Zool. Jahrb., Syst., Bd 9, 1895, p. 83, Bd 10, 1898, pl. 28, f. 17. ALCOCK's description (l. c. p. 396) seems to be applied equally well to *G. crinipes* as to *G. lividus* subsp. *stormi*, for the transverse markings on the carapace

1. *Geograpsus lividus* (H. Milne-Edwards) subsp. *stormi* de Man.

1895. *Geograpsus lividus* (H. Milne-Edwards) var. *stormi* de Man. Zool. Jahrb., Syst., Bd 9, p. 88, Bd 10, 1898, pl. 28, f. 18*a*, *c*.

Stat. 64. Tanah Djampea, Flores Sea. 1 ♂.

The specimen, which is larger than those measured by DE MAN, agrees wholly with the description of this author, also with regard to its colour. Both chelipeds are wanting.

From the typical *G. lividus* the subspecies is only distinguished by the sharp keel originating from the antero-lateral angles of the buccal cavern being convex, whereas in the typical Atlantic specimens it is straight or slightly sigmoid.

*G. lividus* has been also recorded by Miss RATHBUN [1]) from the Hawaiian Islands, but the subspecies, which has been originally found at Atjeh, inhabits [2]) likewise the eastern tropical Pacific (Marquesas, etc.).

Dimensions in mm.:

| | |
|---|---|
| Distance between external orbital angles | 28.5 |
| Breadth of carapace | 35.25 |
| Posterior margin of carapace | 11.— |
| Breadth of front between eye-stalks | 14.75 |
| Length of carapace | 29.— |
| Length of meropodite of 2nd pair of walking legs | 25.— |
| Breadth of meropodite of 2nd pair of walking legs | 12.5 |
| Length of meropodite of 3d pair of walking legs | 22.— |
| Breadth of meropodite of 3d pair of walking legs | 11.5 |

Comparing these measurements with those of DE MAN we may state, that in my specimen the posterior margin of the carapace is relatively shorter as compared with the maximum breadth; the length on the other hand is somewhat greater.

## Pachygrapsus Randall.

1839. *Pachygrapsus* Randall. Proc. Ac. Nat. Sc. Philadelphia, 1839, p. 126.

From the two preceding genera *Pachygrapsus* is distinguished by its broader front, that occupies more than half the greatest breadth of the carapace, from *Metopograpsus* by the antennae not being excluded from the orbit.

Key to the species:

1. No tooth behind external orbital angle . . . . . 2
   One tooth behind external orbital angle . . . . . 7
2. Lateral margins of carapace very strongly convergent backward; external orbital angle acute; transverse folds extending across mesogastric region. Propodites of walking legs short *P. minutus* A. Milne-Edwards

are stated to be "distinct and nearly straight" (as in the former species), whereas the fissure in the lower orbital border is deep and the meropodites of the last 3 pairs of legs are broader than half their length, which agrees with what is found in the latter form. The distribution agrees with that of the preceding species.

1) Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, 1906, p. 839.

2) RATHBUN, Mem. Mus. comp. Zool. Harvard Coll., v. 35, n° 2, 1907, p. 29.

| | | |
|---|---|---|
| | Lateral margins of carapace subparallel or feebly convergent backward; in the latter case mesogastric region smooth . | 3 |
| 3. | Carapace with very strong transverse folds across the whole breadth, the anterior folds fringed with hairs lying flatly on the carapace and averaging in length half the space between the folds . . . . . | 4 |
| | Carapace with feeble transverse striae, that do not extend across the median parts of the carapace . . . . . | 5 |
| 4. | Lateral margins of carapace faintly convergent backward. . | *P. plicatus* (H. Milne-Edw.) |
| | Lateral margins of carapace subparallel; striation coarse . . | *P. fakaravensis* Rathbun [1]) |
| 5. | Front scarcely declivous, wholly visible from above. Lateral margins of carapace scarcely convergent backward, concave. Meropodites of two last pairs of legs with only one subdistal spine at posterior margin. Propodites of penultimate pair of legs four times as long as broad . . . . . | *P. planifrons* de Man |
| | Front distinctly declivous. Lateral margins of carapace somewhat convergent backward, straight. Meropodites of all the walking legs with 2—3 subdistal spines at posterior margin. Propodites of penultimate pair of legs only three times (or less) as long as broad . . . . . | 6 |
| 6. | Distance between external orbital angles $1^1/_3$ times the length of carapace. Postfrontal lobes four in number. Inner margin of ischium of external maxilliped straight; inner angle of merus obtuse, less produced. . . . . | *P. propinquus* de Man [2]) |
| | Distance between external orbital angles $1^1/_2$ times the length of carapace. Postfrontal lobes seven in number, the median one very small, triangular. Inner margin of ischium of external maxilliped concave; inner angle of merus more produced . . . . . | *P. laevis* Borradaile [3]) |
| 7. | Distal posterior angle of meropodites of last pair of legs rounded. Front with a prominent tooth at angle. . . . | *P. crassipes* Randall [4]) |
| | Distal posterior angle of meropodites of last pair of legs dentate. Fingers of cheliped with a reddish-brown patch in the middle of the outer surface . . . . . | *P. transversus* (Gibbes) [5]) |

1) Mem. Mus. comp. Zool. Harvard Coll., v. 35, nº 2, 1907, p. 29, pl. 5, f. 1, pl. 9, f. 6—6*a*. Hab. Paumotus.

2) Rec. Ind. Mus. Calcutta, v. 2, prt 3, 1908, p. 216, pl. 18, f. 2. Hab. brackish water at Port Canning (Lower Bengal).

3) Proc. Zool. Soc. London, 1900, p. 592, pl. 42, f. 7. Hab. Funafuti.

4) Literature: KINGSLEY, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 199. Description: DE MAN, Notes Leiden Mus., v. 12, 1890, p. 86, pl. 5, f. 11. Hab. Pacific region.

5) Literature and description: DE MAN, Mém. Soc. Zool. France, 1900, p. 52, pl. 2, f. 9. Throughout all tropical regions, but chiefly Atlantic.

1. *Pachygrapsus plicatus* (H. Milne-Edwards).

1837. *Grapsus plicatus* H. Milne-Edwards. Hist. nat. Crust., t. 2, p. 89.
1843. *Grapsus plicatus* [1]) Krauss. Südafr. Crust., p. 43, pl. 3, f. 1.
1852. *Goniograpsus plicatus* Dana. U. S. Expl. Exp., Crust., p. 343.
1853. *Grapsus plicatus* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 20, p. 170.
1858. *Pachygrapsus plicatus* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 102.
1873. *Pachygrapsus striatus* A. Milne-Edwards. Journ. Mus. Godeffroy, t. 4, p. 82.
1873. *Pachygrapsus plicatus* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 292, pl. 14, f. 1.
1880. *Pachygrapsus plicatus* Kingsley. Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 200.
1894. *Pachygrapsus plicatus* Ortmann. Zool. Jahrb., Syst., Bd 7, p. 708.
1903. *Pachygrapsus plicatus* Borradaile. Faun. Geogr. Maldives etc., v. 1, p. 432.
1906. *Pachygrapsus plicatus* Rathbun. Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, p. 839.
1907. *Pachygrapsus plicatus* Stimpson. Smithson. Inst., Miscell. Coll., v. 49, p. 117.
1907. *Pachygrapsus plicatus* Rathbun. Mem. Mus. comp. Zool. Harvard Coll., v. 35, n° 2, p. 29.
1911. *Pachygrapsus plicatus* Rathbun. Transact. Linn. Soc. London (2) v. 14, p. 241.

Stat. 34. Labuan Pandan, Lombok. 1 ♀ (with eggs).

This well marked species is rather common in the Pacific region; the records from the Indian region are scanty (Borradaile, Rathbun, 1911).

2. *Pachygrapsus minutus* A. Milne-Edwards.

1873. *Pachygrapsus minutus* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 292, pl. 14, f. 2.
1880. *Pachygrapsus minutus* Kingsley. Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 201.
1883. *Pachygrapsus minutus* de Man. Notes Leyden Mus., vol. 5, p. 158.
1888. *Pachygrapsus minutus* de Man. Journ. Linn. Soc. London, v. 22, p. 148.
1888. *Pachygrapsus minutus* de Man. Arch. Naturgesch., Jahrg. 53, 1., p. 368.
1889. *Pachygrapsus minutus* Cano. Boll. Soc. Nat. Napoli, t. 3, p. 240.
1900. *Pachygrapsus minutus* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 399.
1900. *Pachygrapsus minutus* Borradaile. Proc. Zool. Soc. London, 1900, p. 592.
1903. *Pachygrapsus minutus* Borradaile. Faun. Geogr. Maldives etc., v. 1, p. 432.
1905. *Pachygrapsus minutus* Lenz. Abhandl. Senckenb. Gesellsch., Bd 27, p. 370.
1906. *Pachygrapsus minutus* Rathbun. Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, p. 840.
1907. *Pachygrapsus minutus* Rathbun. Mem. Mus. comp. Zool. Harvard Coll., v. 35, n° 2, p. 30.
1911. *Pachygrapsus minutus* Rathbun. Transact. Linn. Soc. London (2) v. 14, p. 242.
1913. *Pachygrapsus minutus* Pesta. Denkschr. Ak. Wiss. Wien, Bd 88, p. 61.

Stat. 129. Karkaralong Islands, south of Mindanao. 1 ♂.

This small species that is distributed throughout the whole Indo-Pacific region, presents at the hind margin of the meropodites of the posterior walking legs, besides the large spine near the distal end, that is followed by a much smaller one, also a small, obtuse prominence at the end of the proximal third part of this margin, and this prominence is marked by a long hair.

3. *Pachygrapsus planifrons* de Man.

1888. *Pachygrapsus planifrons* de Man. Arch. Naturgesch., Jahrg. 53, 1., p. 368, pl. 16, f. 2.
1893. ? *Pachygrapsus longipes* Rathbun. Proc. U. S. Nat. Mus., v. 16, p. 247.

1) According to Dana, however, the specimens of Krauss belong to an independent species, which is called *Goniograpsus kraussi*, distinguished by having numerous teeth along the posterior margin of the meropodites of the last pair of legs. H. Milne-Edwards (1853) followed Dana, but persisted in referring the species to *Grapsus*.

1903. *Pachygrapsus planifrons* Borradaile. Faun. Geogr. Maldives etc., v. 1, p. 432.
1905. *Pachygrapsus planifrons* Lenz. Abhandl. Senckenb. Gesellsch., Bd 27, p. 370.
1906. ? *Pachygrapsus longipes* Rathbun. Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, p. 840, pl. 8, f. 7.
1907. ? *Pachygrapsus longipes* Rathbun. Mem. Mus. comp. Zool. Harvard Coll., v. 35, n° 2, p. 30.
1911. ? *Pachygrapsus longipes* Rathbun. Transact. Linn. Soc. London (2) v. 14, p. 242.

Stat. 34. Labuan Pandan, Lombok. 1 ♀.

De Man [1]) observed, that *P. longipes* is most nearly related to, if not identical with, his *P. planifrons*, and indeed, both descriptions and figures agree very well. My specimen, anyhow, is certainly *P. planifrons*, though in some points there is some disagreement. Firstly the front is not nearly horizontal, but obliquely deflexed, and secondly the merus of the external maxilliped is not nearly circular, as depicted by de Man, but agrees with that of *P. propinquus*; the inner margin of the ischium is concave, as in *P. laevis*. The infra-orbital border is entire, not dentate, as in *P. plicatus*, and strongly sloping backward in its outer half. The propodites of the penultimate pair of legs (which are the most elongate) are five times as long as broad, which agrees with *P. longipes*; the propodites of all the legs are not unarmed, as de Man says, but there are two movable spines at the distal end of the inner or posterior margin, besides the usual stiff hairs of these joints.

## Metopograpsus H. Milne-Edwards.

1853. *Metopograpsus* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 20, p. 164.

The genus has been sometimes confounded with *Pachygrapsus*, but the antennae are always excluded from the orbit by means of the broad inner orbital lobe, that joins the front. In the literature, nevertheless, some cases are mentioned where there is a more or less wide gap between the orbital lobe and the front.

De Man [2]) was the first to discriminate exactly the species, but up to recent times some authors continue to regard some species as identical with, or at most varieties of, others. Yet Kingsley [3]) undoubtedly goes too far in admitting only three species.

Key to the species:

1. Antero-lateral margins of carapace without tooth behind external orbital angle . . . . . 2
   Antero-lateral margins of carapace with one tooth behind external orbital angle . . . . . 6
2. Walking legs short, dactyli nearly as long as propodites . 3
   Walking legs longer, dactyli distinctly shorter than propodites 5
3. Carapace less widened proximally (lateral margins scarcely convergent backward). Inner orbital lobe coalesced with the front over a short distance, rounded, not keeled . 4

1) Rec. Ind. Mus. Calcutta, v. 2, prt 3, 1908, p. 218.
2) Arch. Naturgesch., Jahrg. 53. 1., 1888, p. 359—360.
3) Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 190—191.

Carapace widened proximally (lateral margins distinctly convergent backward). Inner orbital lobe coalesced with the front over nearly the whole inner margin, sharp and keeled . . . . . *M. messor* Forskål

4. Front broader, orbits small . . . . . *M. eydouxi* H. Milne-Edwards [1])

Front narrower, orbits wide . . . . . *M. thukuhar* (Owen)

5. Lateral margins of carapace much convergent backward; distance between external orbital angles to length of carapace as 100 : 84—87% in small and medium-sized and 100 : 89—92% in large specimens . . . . . *M. latifrons* (White)

Lateral margins of carapace less convergent backward; distance between external orbital angles to length of carapace as 100 : ± 80% . . . . . *M. maculatus* H. Milne-Edwards

6. Postfrontal lobes little prominent; front not strongly declivous; internal orbital lobe broad and rounded at tip, coalesced with the front along a short distance (as in *M. thukuhar*). Dactyli of walking legs only slightly shorter than propodites . . . . . *M. quadridentatus* Stimpson [2])

Postfrontal lobes more distinct and sharply separated; front strongly deflexed; internal orbital lobe narrow and acute at tip, coalesced with the front along greater distance (as in *M. messor*). Dactyli of walking legs much shorter than propodites . . . . . *M. oceanicus* (Jacquinot et Lucas)

1. *Metopograpsus messor* (Forskål).

Literature: ALCOCK, l. c. p. 397. Description: DE MAN, Journ. Linn. Soc. London, v. 22, 1888, p. 144, pl. 9, f. 11; Arch. Naturg., Jahrg. 53, 1., p. 361, pl. 15, f. 6.
*Grapsus (Pachygrapsus) aethiopicus* [3]) Hilgendorf. v. d. Decken's Reis. Ost-Afrika, Bd 3, 1., Crust., 1869, p. 88, pl. 4, f. 2.

Stat. 47. Bay of Bima, Sumbawa. 12 ♂ (mostly juv.), 1 ♀ with eggs.
Stat. 71. Macassar. 1 ♂.

MIERS [4]) described a subsp. *frontalis* from Macassar and other localities, which seems to be an individual variation and has not been maintained by subsequent authors,

Another subspecies (*gracilipes*) has been founded by DE MAN [5]), originally from the

1) Ann. Sc. Nat. (3) t. 20, 1853, p. 165. It must be admitted, that the differences between this species and *M. thukuhar* are insignificant, and KINGSLEY already identified both species with *M. messor*; the same has been done in recent years by Miss RATHBUN (Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, 1906, p. 839) in dealing with the marine Brachyura and Macrura of the Hawaiian Islands. It is from this very locality that both *M. eydouxi* and *M. thukuhar* originate.

2) Description: DE MAN, Zool. Jahrb., Syst., Bd 9, 1895, p. 76, Bd 10, 1898, pl. 28, f. 16.

3) Even in recent days the species has been referred to under this name by DOFLEIN (Wiss. Erg. Tiefsee-Exp. "Valdivia", Bd 6 (Crust.), 1904, p. 130, and implicitly ranged with *Pachygrapsus*. With the name *Metopograpsus messor* the author is apparently unacquainted.

4) Ann. Mag. Nat. Hist. (5) v. 5, p. 311; Rep. "Challenger", Brachyura, 1886, p. 258.

5) Notes Leiden Mus., v. 13, 1891, p. 49, pl. 4, f. 14.

Pacific, but afterwards [1]) also from Borneo and Malacca; the author in his later paper expressed the opinion, that this subspecies, characterized by slender and more elongate propodites of the penultimate pair of legs, which are nearly 3 times as long (in the median line) as broad, in the Indo-Malayan waters most likely replaces the typical form of the Red Sea.

On comparing the figures serving to illustrate the differences between the typical form [2]) and the subspecies [3]) we indeed observe the slightly more elongate shape of the said propodites. All the "Siboga" specimens belong to the subsp. of DE MAN.

2. *Metopograpsus thukuhar* (Owen).

1839. *Grapsus thukuhar* Owen. Zool. capt. Beechey's Voy. "Blossom" p. 80, pl. 24, f. 3.
1839. *Grapsus parallelus* Randall. Journ. Ac. Nat. Sc. Philadelphia, v. 8, p. 127.
1852. *Goniograpsus thukujar* Dana. U. S. Expl. Exp., Crust., p. 344.
1853. *Metopograpsus thukuhar* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 20, p. 165.
1865. *Metopograpsus thukuhar* Heller. Reise "Novara", Crust., p. 43.
1873. *Metopograpsus thukuhar* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 290.
1880. *Metopograpsus messor* (part.) Kingsley. Proc. Acad. Nat. Sc. Philadelphia, 1880. p. 190.
1882. *Goniograpsus thukujar* Haswell. Cat. Austral. Crust., p. 99.
1888. *Metopograpsus thukuhar* de Man. Arch. Naturgesch., Jahrg. 53, 1., p. 362, pl. 15, f. 5.
1894. *Metopograpsus messor* var. *thukuhar* Ortmann. Zool. Jahrb., Syst., Bd 7, p. 702.
1895. *Metopograpsus thukuhar* de Man. Zool. Jahrb., Syst., Bd 9, p. 76.
1906. *Metopograpsus messor* (part.) Rathbun. Bull. U. S. Fish Comm. for 1903, v. 23, prt 2, p. 839.

Stat. 50. Labuan Badjo, west coast of Flores. 1 ♂ juv.
Stat. 142. Obi Major, south of Halmaheira. 1 ♂.
Stat. 181. Ambon. 1 ♀ juv.
Stat. 323. Bawean Island, Java Sea. 1 ♀ juv.

All the specimens, save one of medium size, are very minute and measure only a few millimetres across the carapace.

According to ORTMANN this species does not live in the Indian Ocean, but only in the Pacific; here it lives together with the genuine *M. messor* and may replace this species entirely towards the eastern parts. Its occurrence in the Indo-Malayan Archipelago has been already noted by DE MAN. Notwithstanding the careful researches of this author, who clearly separated the two named species, on account of the more or less convergence of the lateral margins of the carapace and the shape of the inner orbital lobe, Miss RATHBUN seems to unite the species altogether.

3. *Metopograpsus maculatus* H. Milne-Edwards.

Literature: ALCOCK, l. c. p. 398. Description: DE MAN, Journ. Linn. Soc. London, v. 22, 1888, p. 145, pl. 10, f. 1—3.

Stat. 47. Bay of Bima, Sumbawa. 1 ♀.

1) Zool. Jahrb., Syst., Bd 9, 1895, p. 75; Notes Leiden Mus., v. 21, 1899, p. 132.
2) Arch. Naturgesch., Jahrg. 53, 1., 1888, pl. 15, f. 6.
3) Notes etc., 1891, pl. 4, f. 14.

4. *Metopograpsus latifrons* (White).

1847. *Grapsus latifrons* White. Jukes' Voy. "Fly", v. 2, p. 337, pl. 2, f. 2.
1853. *Metopograpsus latifrons* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 20, p. 166.
1867. *Metopograpsus pictus* A. Milne-Edwards. Ann. Soc. Entom. France, t. 7, p. 283.
1873. *Metopograpsus pictus* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 289. pl. 13, f. 2.
1879. *Metopograpsus pictus* de Man. Notes Leiden Mus., v. 1, p. 68.
1880. *Metopograpsus latifrons* Kingsley. Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 191.
1888. *Metopograpsus latifrons* de Man. Arch. Naturgesch., Jahrg. 53, 1., p. 360.
1888. *Metopograpsus pictus* de Man. Ibid., p. 363.
1892. *Metopograpsus latifrons* de Man. Weber's zool. Erg. Reise niederl. Ost-Indien, Bd 2, p. 314.
1894. *Metopograpsus latifrons* Ortmann. Zool. Jahrb., Syst., Bd 7, p. 703.
1910. *Metopograpsus latifrons* Rathbun. K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n° 4, p. 325.

Stat. 47. Bay of Bima, Sumbawa. 2 ♂, 3 ♀ (one with eggs).
Stat. 86. Dongala, west coast of Celebes. 1 ♀ with eggs.
Stat. 200. Bay of Bara, Buru, 1 ♂ juv.

In 1888 DE MAN was inclined to unite *M. latifrons* and *M. maculatus*, but in 1892 he clearly discriminated these species and *M. pictus*. It is a matter of some disappointment, that in 1910 Miss RATHBUN again takes *M. maculatus* as a synonym of *M. latifrons*, quite as ALCOCK has done before, with absolute disregard of DE MAN's painstaking researches on this subject.

With the aid of the Leiden Museum material I again undertook the task of comparing *M. latifrons* and *M. maculatus* and found that in the latter species the greatest breadth of the carapace (distance between external orbital angles) to the length is 100 : 77—80, but in *M. latifrons* the proportion is 100 : 84—91, according to age, viz.: in young and medium-sized specimens of both species the carapace is proportionally broader than in old individuals. According to DE MAN (1892) the proportion is 30 : 23 in *M. maculatus*, but 30 : 26 in *M. latifrons*.

Although the longer carapace of *M. latifrons* enables us to distinguish both species, the same cannot be said of *M. latifrons* and *M. pictus*. I have measured 19 specimens that I take to be *M. latifrons*, and among them the type of "*Grapsus*" *dilatatus* de Haan, which was declared by DE MAN (1879) to be identical with *M. pictus*, in which the ratio of the maximum breadth of the carapace to the length varies from 100 : 84—85 in the smaller individuals (breadth of carapace 16.5—± 25 mm.) to 100 : 86—91 in older specimens (breadth of carapace up to 35.5 mm.; in the largest specimens only the length is 90% or more of the maximum breadth). It is true, that in MILNE-EDWARDS' original description of *M. pictus* the maximum breadth is said to be equal to the length of the carapace (37 mm.), but in the figure the latter dimension is less (92% of the maximum breadth). Conform to ORTMANN's opinion (1894) I presume, then, that indeed *M. latifrons* and *M. pictus* are identical and that the latter species has been founded on a very large individual.

1. *Metopograpsus oceanicus* (Jacquinot et Lucas).

1842. *Grapsus oceanicus* Jacquinot et Lucas. Voy. "Astrolabe" et "Zélée", Crust., p. 73, pl. 6, f. 9.

1853. *Metopograpsus oceanicus* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 20, p. 166.
1865. *Metopograpsus oceanicus* Heller. Reise "Novara", Crust., p. 44.
1883. *Metopograpsus oceanicus* de Man. Notes Leiden Mus., v. 5, p. 158.
1888. *Metopograpsus oceanicus* de Man. Arch. Naturgesch., Jahrg. 53, 1., p. 364.
1894. *Metopograpsus oceanicus* Ortmann. Denkschr. med.-naturw. Gesellsch. Jena, Bd 8, p. 55.
1899. *Metopograpsus oceanicus* Nobili. Ann. mus. civ. stor. nat. Genova (2) t. 20, p. 265.
1900. *Metopograpsus oceanicus* Lanchester. Proc. Zool. Soc. London, 1900, p. 755.
1902. *Metopograpsns oceanicus* de Man. Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, p. 503.

Stat. 16. Kangeang Island, east of Madura. 1 ♀ juv.
Stat. 47. Bay of Bima, Sumbawa. 1 ♂ juv., with parasitic Isopod in left branchial cavity.
Stat. 86. Dongala, west coast of Celebes. 2 ♂ juv., 3 ♀ (1 juv., 1 with eggs).
Stat. 115. Bay of Kwandang, north coast of Celebes. 1 ♂ juv.
Stat. 163. Seget, west coast New Guinea. 1 ♂.

Lanchester supposes *Pachygrapsus transversus* (Gibbes) to be a variety of *Metopograpsus oceanicus* (not of *M. messor* as Walker [1]) had presumed some years before) on account of the inner orbital lobe being reduced in such a way as to make the antenna extend freely into the orbit. It is true, that the acute orbital lobe in some specimens leaves a rather large distance between the tip of the lobe and the rounded external angle of the front but yet the antenna does never enter the orbit, neither in my specimens nor in those examined by de Man, for the upper margin of the lobe is always in contact with the front along a large distance. Besides, as far as I can see, *M. oceanicus* grows to a much larger size and never presents the characteristic transverse ridges on the carapace, so conspicuous in *P. transversus*.

With *M. quadridentatus* Stimpson the present species shares the presence of an epibranchial tooth behind the external orbital angle; the differences between both species have been discussed by de Man (1883). Save for this character *M. oceanicus* is more closely related to *M. messor* (Forskål), whereas *M. quadridentatus* is nearest to *M. thukuhar* (Owen).

The present species seems to attain a larger size than any of the other species. One egg-bearing ♀ of the Leiden Museum, from the east coast of Atjeh (mouth of Arakundur River), has a maximum breadth of carapace of exactly 40 mm., the length is 32 mm. This is by far the largest specimen I know of.

## Subfam. Varuninae.

This subfamily contains a number of littoral crabs, the carapace of which is somewhat vaulted, and mostly with arched lateral margins; the front is not strongly deflexed and may even be entirely horizontal; the gap between the external maxillipeds is rarely wide and does not present the lozenge-shape of the *Grapsinae*; the abdomen of the ♂ rarely occupies all the space between the last pair of legs and the chelae of the ♂ are very often clothed with hairs.

Key to the genera:

1. Palp of ext. maxillipeds articulating with middle of anterior margin of merus. . . . . 2

1) Journ. Linn. Soc. London, v. 20, 1887, p. 113.

Palp of ext. maxillipeds articulating with outer angle of anterior margin of merus . . . . . 11

2. Exognath of ext. maxillipeds broader than, or at least as broad as, ischium. Dactyli of legs not flattened . . . 3

Exognath of ext. maxillipeds narrower than ischium . . 4

3. Carapace flat, depressed . . . . . **Ptychognathus** Stimpson

Carapace convex in both directions. Meropodites of walking legs with spines along posterior margin . . . . . **Pyxidognathus** A. Milne-Edw.

4. Lateral margins of carapace entire, without teeth. Front about one-third width of carapace. Ischium and merus of ext. maxillipeds distinctly wider than long. Very small species . . . . . **Acmaeopleura** Stimpson [1])

Lateral margin of carapace dentate . . . . . 5

5. Breadth of carapace equal to of slightly less than length; one obscure tooth behind ext. orbital angle. Merus of ext. maxillipeds broader than long, scarcely auriculate. Legs flattened, heavily fringed with hairs at outer margin. . **Planes** Leach [2])

Carapace always wider than long . . . . . 6

6. Merus of ext. maxillipeds auriculate at distal outer angle 7

Merus of ext. maxillipeds not expanded at distal outer angle, nearly quadrate . . . . . 9

7. Propodites of walking legs cylindrical, dactyli styliform. . 8

Propodites of walking legs flattened, natatorial, as also are the dactyli. Front horizontal, anterior margin perfectly straight. . . . . **Varuna** H. Milne-Edwards

8. Very aberrant species, Xanthoid-like; lateral margins of carapace diverging considerably backward in their anterior half, with two epibranchial teeth behind ext. orbital angle; the latter and the first epibranchial tooth serrulate at outer margin aad separated by a very wide sinus. Merus and ischium of ext. maxillipeds both wider than long (as in *Acmaeopleura*); ischium shorter than merus; suture between them angular. Chelipeds of ♂ very bulky, much

1) Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 105; Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 130. The genus is founded on *A. parvula* Stimpson (l. c., 1907, p. 130, pl. 11, f. 4), found at Ousima, and recently Miss RATHBUN added a second species, *A. rotunda* (K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, nº 4, 1910, p. 327, textfig. 10) from the Gulf of Siam.

2) Former authors have distinguished several species within this genus, but now it is generally believed, that there are only two. The type species is *Planes minutus* (Linné), that was originally referred to *Cancer* by LINNÉ and HERBST, to *Grapsus* by LATREILLE. As is well known, this is the common and very variable Gulf Stream crab, occurring in great numbers on the floating Sargassum, but also on turtles, on floating timber etc. It has been met with in all the warmer seas but is essentially Atlantic. The second species is *Planes marinus* Rathbun (Proc. U. S. Nat. Mus., v. 47, 1914, p. 120) from Lower California.

BELL (Hist. Brit. stalk-eyed Crust., 1853, p. 134), KINGSLEY (Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 201—202, note) and STEBBING (S. A. Crust., prt 5, 1910, p. 320) all agree in stating that *Planes* is a manuscript name of LEACH, and that it was first published by BOWDICH in 1825 (Exc. to Madeira and Porto Santo, p. 15, f. 2*a*, 2*b*).

larger than walking legs; fingers widely gaping. Joints of walking legs cylindrical; first pair with unequal teeth at inner (hind) margin of meropodites . . . . . **Baruna** Stebbing [1])

Teeth at lateral margins of carapace not serrulate, flattened and separated by very narrow notches; carapace subcircular. Merus of ext. maxillipeds about as broad as long, and shorter than ischium . . . . . **Pseudograpsus** H. Milne-Edw.

9. Merus of ext. maxillipeds broader than long and shorter than ischium . . . . . **Utica** White

Merus of ext. maxillipeds as long as, or longer than, broad 10

10. Front nearly half as wide as carapace; lateral margins three-toothed on either side . . . . . **Brachynotus** de Haan

Front not more than one-third the breadth of carapace; lateral margins usually four-toothed on either side . . **Eriocheir** de Haan

11. One tooth behind ext. orbital angle. Suture between ischium and merus of ext. maxillipeds horizontal . . . . . **Perigrapsus** Heller [2])

Two teeth behind ext. orbital angle. Suture between ischium and merus of ext. maxillipeds very oblique . . . . **Gaetice** Gistel [3])

## **Varuna** H. Milne-Edwards.

1830. *Varuna* H. Milne-Edwards. Dict. cl. d'Hist. nat., t. 16, p. 511.
1835. *Trichopus* de Haan. Faun. Japoń., p. 32.

Carapace depressed, flattened; front horizontal, at least in adult individuals, but apparently somewhat oblique in young specimens, with the anterior margin quite straight. The merus of the external maxillipeds is strongly auriculate, and the exognath is much narrower than the ischium. The last three joints of the walking legs are much flattened, and heavily fringed at both margins.

Key to the species:

Carapace perfectly hairless. Upper orbital margin fissured. Epibranchial teeth well defined. . . . . *V. litterata* (Fabricius)

Carapace and legs thickly covered with a hairy fur. Upper orbital fissure scarcely present. Epibranchial teeth separated by an indistinct notch . . . . . *V. tomentosa* Pfeffer [4])

---

1) Spolia zeylanica, v. 2, prt 5, 1904, p. 3, with the single species *B. socialis* (p. 3, pl. 1 *A*), found in brackish water (Lake Negombo) at Ceylon.

2) Verhandl. Zool. Bot. Gesellsch. Wien, 1862, p. 522; Reise "Novara", Crust., 1865, p. 50. There is only one species, *P. excelsus* Heller ("Novara", p. 50, pl 5, f. 1) occurring at Tahiti.

3) The name *Gaetice* Gistel has been substituted by Miss RATHBUN (Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 128, note to STIMPSON's memoir on North Pacific crabs), the original names *Platynotus* de Haan (Faun. Jap., 1835, p. 34 and *Platygrapsus* Stimpson (Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 104) being both preoccupied. There is probably only one species *G. depressus* (de Haan) (Faun. Jap., 1835, p. 63, pl. 8, f. 2) from Japan, another species, *G. convexiusculus* (Stimpson) (see Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 128, pl. 17, f. 3) from the Loo-Choo Islands, being most likely not distinct.

4) Jahrb. Hamb. wiss. Anst., Jahrg. 6, 2., 1889, p. 30. In fresh water near Zanzibar.

1. *Varuna litterata* (Fabricius).

Literature and description: ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, p. 401.

Stat. 4. Djangkar, north-east coast of Java. 7 ♂, 1 ♀.
Stat. 19. Labuan Tring, west coast of Lombok. 3 ♂ juv.
Stat. 33. Bay of Pidjot, east coast of Lombok. 2 ♂ juv.
Stat. 50. Labuan Badjo, west coast of Flores. 2 ♂ juv,
Stat. 58. Seba, Savu Island, west of Timor. 7 ♂ (1 ad., 6 juv.).
Stat. 234. Nusa Laut, east of Ambon. 1 ♀ juv.

This well known species is found everywhere throughout the Indo-Pacific region, and, as ALCOCK remarks, it ascends estuaries even into freshwater, though also commonly met with at sea on floating timber. The "Siboga" specimens were all caught in rivers.

The terminal segment of the abdomen of the very young ♂ is about as long as broad, not of the elongate shape that is observed in the adult.

## Ptychognathus Stimpson.

1858. *Ptychognathus* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 104.
1868. *Gnathograpsus* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 4, p. 180.
1880. *Coelochirus* Nauck. Zeitschr. wiss. Zool., Bd 34, p. 66.

DE MAN [1]) has been the first to recognize the identity of *Ptychognathus* and *Gnathograpsus* and the same author has stated [2]), that *Coelochirus* has been founded likewise on a species of the present genus.

The genus contains a rather great number of species, some of which have a perfectly horizontal and straight front, resembling that of *Varuna*, while in others it is obliquely deflexed. Now Miss RATHBUN [3]) recently proposes to include those species with a *Varuna*-like front, with the epibranchial teeth acute and well separated, and the wrist of the chelipeds armed at the inner angle with a tooth, into the genus *Varuna*. I have preferred, however, to maintain *Ptychognathus* in its original conception, according to which the genus is characterized by the broad exognath, that is at least as broad as, generally, especially in the ♂, much broader then, the ischium of the external maxillipeds, whereas in *Varuna* the exognath is much narrower than the ischium. Besides, in *Varuna* the exognath is thin, lamellar and hairy at the outer surface, in both sexes, but in the ♂ of *Ptychognathus* it is convex, thick and wholly glabrous.

The discrimination of the species is rendered difficult by the rather considerable differences between the two sexes of the same species. The best key to all the Indo-Pacific species is that recently given by DE MAN [4]), for ♂ and ♀ separately. After the publication of his key no less than 4 new specimens have been described by Miss RATHBUN (one of these referred to *Varuna*) viz.:

1) Notes Leiden Mus., v. 5, 1883, p. 161.
2) Zool. Jahrb., Syst., Bd 2, 1887, p. 719.
3) Proc. U. S. Nat. Mus., v. 47, 1914, p. 69.
4) Proc. Zool. Soc. London, 1905, p. 543—544.

*Pt. easterana*, Mem. Mus. comp. Zool. Harvard Coll., v. 35, n$^0$ 2, 1907, p. 31, pl. 2, f. 4, pl. 7, f. 4—4*a*. Easter Island (eastern Pacific)

*Pt. johannae*, Proc. U. S. Nat. Mus., v. 46, 1914, p. 354, pl. 30, f. 1—3. Johanna Island (western Indian Ocean)

*Pt. altimanus* (*Varuna altimana*), Proc. U. S. Nat. Mus., v. 47, 1914, p. 70. Luzon (Philippines)

*Pt. guijulugani*, Proc. U. S. Nat. Mus., v. 47, 1914, p. 71. Negros (Philippines)

Though the "Siboga" expedition has not added any new species to the list, one of Miss RATHBUN's new species has been collected.

Key to the species (based on the characters of the ♂) [1]):

1. Carapace with antero-lateral teeth sharp and salient; regions distinct; front laminar, straight. Inner angle of arm nearly always armed with a more or less long spine. Meropodites of ambulatory legs with a subdistal spine at anterior margin . . . 2

   Carapace with antero-lateral teeth not very acute; regions generally indistinct; front more or less sinuous at anterior margin. Inner angle of wrist subrectangular or slightly pronounced, but never spiniform. Meropodites of ambulatory legs near distal end of anterior margin with a blunt prominence or unarmed . . . . . 7

2. Inner angle of wrist of cheliped with a small tooth (no spine); inner surface of palm hairy . . . . . *Pt. dentatus* de Man [2])

   Inner angle of wrist of cheliped spiniform; inner surface of palm not hairy . . . . . 3

3. A tuft of hair in the finger-cleft, extending along the fixed finger . . . . . *Pt. onyx* Alcock [3])

   Chelae entirely without hairs . . . . . 4

4. Upper border of palm transformed into a compressed keel; inner angle of wrist with a long spine . . . . . 5

   Upper border of palm simply rounded; inner angle of wrist with a short spine . . . . . 6

5. Exognath of ext. maxillipeds twice as broad as ischium . . *Pt. spinicarpus* Ortmann [4])

   Exognath of ext. maxillipeds about $1^1/_2$ times as broad as ischium . . . . . *Pt. altimanus* (Rathbun)

6. Ext. orbital angle and anterior epibranchial tooth separated by a narrow sinus; distance betw. ext. orbital angles much

1) In preparing this key I have based myself on the division of the genus into three sections that were distinguished by DE MAN (l. c. p. 542).

2) Weber's zool. Erg. Reise niederl. Ost-Indien, Bd 2, 1892, p. 318, pl. 18, f. 9; ALCOCK, l. c. p. 403. Hab. Celebes, Bay of Bengal and Upper Tenasserim.

3) L. c. p. 404. Hab. Tavoy. Ill. Zool. "Investigator", Crust. prt. 10, 1902, pl. 65, f. 4.

4) See DE MAN, Zool. Jahrb., Syst., Bd 9, 1895, p. 91, Bd 10, 1898, pl. 28, f. 19. Hab. Atjeh.

shorter than length of carapace. Exognath of ext. maxillipeds $1^2/_3$ times as broad as ischium . . . . . *Pt. polleni* de Man [1])

Ext. orbital angle and anterior epibranchial tooth separated by a broad sinus; distance betw. ext. orbital angles equal to length of carapace. Exognath of ext. maxillipeds exactly as broad as ischium. . . . . *Pt. affinis* de Man

7. Regions on carapace hardly indicated; no epigastric lobes; front prominent. . . . . 8

Regions on carapace (that is decidedly broader than long) more or less distinct, as also the epigastric lobes; front not prominent, sinuous . . . . . 9

8. Only one tooth behind ext. orbital angle; carapace distinctly broader than long. Outer surface of palm smooth, not hairy. Exognath of ext. maxillipeds scarcely broader than ischium . . . . . *Pt. glaber* Stimpson [2])

Two teeth behind ext. orbital angle; carapace scarcely broader than long. A brush of stiff hairs at tip of fixed finger. Exognath of ext. maxillipeds twice as broad as ischium . . . . . *Pt. riedelii* (A. Milne-Edw.)

9. Fingers with a tuft of hairs at base of outer surface . . 10

No tuft of hairs on the fingers . . . . . 13

10. Surface of carapace granulate near the antero-lateral margins; epibranchial teeth scarcely indicated; epigastric lobes distinct. Freshwater species . . . . . *Pt. pusillus* Heller

Surface of carapace punctate or smooth near the antero-lateral margins . . . . . 11

11. Anterior margin of front with a double row of granules, confluent in the middle. Merus of ext. maxillipeds moderately auriculate, so that the greatest breadth is only slightly larger than the length, with the outer portion of the anterior margin convex; exognath $1^1/_3$ times as broad as ischium. Most likely a marine species *Pt. barbatus* (A. Milne-Edw.) [3])

Anterior margin of front either simple or bimarginate. Merus of ext. maxillipeds with a very large auricle, extended laterally, so that the greatest breadth much exceeds the length. . . . . 12

1) *Pt. pusillus* de Man (nec Heller), Notes Leiden Mus., v. 5, (1883) p. 161; *Pt. polleni* de Man, Zool. Jahrb., Syst., Bd 9, 1895, p. 94, Bd 10, 1898, pl. 28, f. 20. Hab. Pasandava Bay (Madagascar).

2) See DE MAN, Weber's zool. Erg. Reise niederl. Ost-Indien, Bd 2, 1892, p. 324, pl. 19, f. 11; STIMPSON, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 129, pl. 17, f. 5—5*a*. Hab. Bonin Islands and Flores.

3) *Gnathograpsus barbatus* A. Milne-Edwards, Nouv. Arch. Mus. Paris, t. 9, 1873, p. 316, pl. 17, f. 4; *Pt. barbata* Alcock, l.c. p. 406; *Pt. barbatus* de Man, Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, 1902, p. 505; *Pt. barbata* Pesta, Denkschr. Ak. Wiss. Wien, Bd 88, 1913, p. 63. Widely spread, but apparently local, throughout Indo-Pacific region.

12. Antero-lateral teeth of carapace not well separated; anterior margin of front bimarginate, sinuous, but nearly straight in dorsal view. Exognath of ext. maxillipeds as broad as ischium, the latter increasing in width distally . . *Pt. johannae* Rathbun [1])

Antero-lateral teeth of carapace separated by triangular incisions; anterior margin of front deeply sinuous in dorsal view. Exognath of ext. maxillipeds somewhat broader than ischium, the latter with subparallel sides. *Pt. guijulugani* Rathbun.

13. Outer surface of palm granulate. Exognath of ext. maxillipeds $1^1/_2$—2 times as broad as ischium. . . . . 14

Outer surface of palm smooth. Exognath of ext. maxillipeds as broad as ischium . . . . . *Pt. pilipes* (A. Milne-Edw.) [2])

14. Distance betw. ext. orbital angles much shorter than length of carapace. Chelae coarsely granulate. Hind margins of propodites of walking legs thickly fringed, *Varuna*-like *Pt. intermedius* de Man [3])

Distance betw. ext. orbital angles very slightly longer than length of carapace. Chelae finely granulate at outer surface; immobile finger with a deep longitudinal groove. Propodites of walking legs with very short setae . . *Pt. easteranus* Rathbun [4])

1. *Ptychognathus altimanus* (Rathbun). Pl. 4, Fig. 5.

1914. *Varuna altimana* Rathbun. Proc. U. S. Nat. Mus., v. 47, p. 70.

Though this species has not been collected by the "Siboga", I had an opportunity of examining 3 specimens, belonging to the Amsterdam Zoological Museum, and brought home from Nias by Dr. KLEIWEG DE ZWAAN. Only one of the two ♂ is quite perfect; the other, much smaller one, lacks both chelipeds and some walking legs, while the ♀, that is egg-bearing, has lost all its limbs. The original specimen came from a river at Luzon (Philippines).

The carapace is much flattened, not granulate, but very minutely punctate. The various regions are not well defined, but some, viz. mesogastric, cardiac, intestinal and inner branchial regions, are inflated, while others (epigastric and hepatic regions) are slightly depressed. The only deep sulcus is the nearly semi-circular cervical groove, situated behind the middle of the carapace, shallower in its median part; from either end parts backward a very short groove, concave outward, and another yet shorter groove runs transversely. The branchial regions are scarcely defined from the obtusely-triangular intestinal area, and laterally they are strongly

1) Proc. U. S. Nat. Mus., v. 46, 1914, p. 354, pl. 30, f. 1—3. Hab. Comoro Islands (north of Madagascar).

2) *Gnathograpsus pilipes* A. Milne-Edwards, Nouv. Arch. Mus. Paris, t. 4, 1868, p. 184, pl. 27, f. 6—10; *Pt. pilipes* Miers: Ann. Mag. Nat. Hist. (5) v. 5, 1880, p. 311; *Coelochirus crinipes* Nauck, Zeitschr. wiss. Zool., Bd 34, 1880, p. 66 (f. DE MAN, Zool. Jahrb., Syst., Bd 2, 1887, p. 719); *Pt. pilipes*? de Man, Weber's zool. Erg. Reise niederl. Ost-Indien, Bd 2, 1892, p. 325. Hab. Philippines, Batjan and Timor.

3) DE MAN, Notes Leiden Mus., v. 1, 1879, p. 69; Weber's zool. Erg. Reise niederl. Ost-Indien, Bd 2, 1892, p. 322, pl. 10, f. 10. Hab. Moluccas and Tahiti (ORTMANN, Zool. Jahrb., Syst., Bd 7, p. 711).

4) Mem. Mus. comp. Zool. Harvard Coll., v. 35, nº 2, 1907, p. 31, pl. 2, f. 4, pl. 7, f. 4—4*a*. Hab. Easter Island.

declivous towards the bases of the second to fourth walking legs; the sloping portions are defined superiorly by a sharp line, somewhat curved anteriorly and nearly continued till the margin of the carapace. There are two pairs of very indistinct transverse depressions, one on the level of the cervical groove and one running inward at the level of the posterior lateral teeth. The epigastric lobes are present, but very indistinct, and anteriorly to these the front is perfectly flat, laminar and horizontal, with a straight anterior margin [1]), that passes with obtuse angles into the lateral margins. The upper orbital margin is strongly S-shaped and separated from the lateral margin of the front by a closed incision, beginning with a triangular sinus. The distance between the external orbital angles is less than the length of the carapace; the angles are prominent, but obtuse at tip, and their lateral margins are markedly diverging backward; the epibranchial teeth are acute, with the lateral margins subparallel, and separated by deep sinuses; the anterior pair of these teeth is larger and more depressed than the posterior pair; distance between tips of posterior pair of teeth is equal to length of carapace. Postero-lateral margins slightly converging backward [2]); posterior margin nearly equal to anterior breadth of front. The front projects a considerable way beyond the bases of the antennules, that are quite concealed in dorsal view, and the bases of which are separated by a triangular "nasal lobe". The epistome is narrow, $6^1/_2$ times as broad as long, excavated, and the posterior margin, between the ridges of the endostome, is somewhat crenulate. The antennae fill the gap between the front and the blunt inner orbital lobe. Pterygostomial regions granular and somewhat hairy; a granulated ridge runs obliquely backward from the anterior angles of the buccal cavern, disappearing distally. In the ♂ the breadth of the exognath of the external maxillipeds measures, according to Miss RATHBUN, $1^3/_5$ times the width of the ischium; in my specimen this exognath is $1^2/_5$ times as broad as the ischium and is much swollen, smooth and entirely glabrous, as is usual in the ♂ of this genus, reaching nearly as far forward as the large auricle of the merus; outer surface of both ischium (the lateral margins of which are subparallel) and merus likewise hairless. In the ♀ the exognath is flattened; it reaches as far forward as in the ♂, but it is much narrower, not attaining even the width of the rather broad ischium [3]); the outer surface of the whole maxilliped is covered with very short hairs (Figs. 5*b* and *c*).

The abdomen of the ♂ is of the usual shape (Fig. 5*a*), with the lateral margins slightly converging forward, the terminal segment being narrow, longer than broad at the base, and the penultimate segment shorter and three-fourths of the width at the base. The eggs of the ♀ are very small and most numerous.

The chelipeds of the ♂ are equal in size, very stout and bulky. The edges of the meropodite are somewhat roughened by granules; upper and inner margins provided with some hairs; there is, besides, a small patch of hairs on the inner surface; the upper margin has no subdistal projection. The wrist ist globular, with some very minute transverse granulated rows on the upper surface; the inner surface is flattened, bordered above and below by a granulated

1) Miss RATHBUN states that it is feebly bilobed, but in all my specimens it is perfectly straight.

2) Subparallel and sinuous according to Miss RATHBUN.

3) Miss RATHBUN states the same for the ♀, but at the beginning of her diagnosis she says that only one specimen (♂) has been caught.

row and ending anteriorly into a rather long, triangular, depressed spine, with the tip acuminate. The chela is as long as the anterior margin of the front; the palm is smooth, but covered with very minute granules when examined under some magnification, shorter than the fingers; the granules are arranged in some oblique rows near the carpal joint, and the upper margin is elevated into a depressed lobe, which occupies, as Miss RATHBUN remarks, the proximal two-thirds of the margin; the outer surface of the palm is somewhat prominent near the carpal joint; a very indistinct horizontal line runs from the carpal joint to the tip of the fixed finger, and a trace of a second (oblique) line is visible above it on the palm; the fingers are very high at the base, largely compressed, very slightly spooned at the tip; the back of the mobile finger is covered with minute granules, and the cutting margin is provided with about 13 obtuse teeth, that are largest in the middle; that of the fixed finger has proximally 6 teeth, increasing gradually in size, so that the two terminal ones are very large, then follow two small teeth and at last a much larger tooth at the beginning of the horny extremity of the finger.

Walking legs long and slender, the penultimate pair being $1^1/_2$ times the maximum breadth of the carapace. Meropodites about $3^1/_2$ times as long as broad, with a sharp subdistal tooth at the anterior margin, except in the case of the terminal pair of legs; both anterior and posterior margins with short hairs, intermingled with longer hairs; above the bases of the legs clusters of club-shaped hairs are observed. Carpo- and propodite together are as long as the meropodite; both margins are fringed with hairs, especially at the hind margin of the much flattened propodite, that is paddle-shaped, and longitudinally-oval in the posterior legs. Dactyli falciform, depressed, as long as the hind margin of the preceding joints, and likewise fringed.

Certainly this species is nearest to *Pt. spinicarpus* Ortmann, with which also Miss RATHBUN compares it; the carapaces of both species seem to resemble each other very much, but the exognath of ORTMANN's species is twice as broad as the ischium of the external maxillipeds, whereas it is only $1^1/_2$ times of the width of the latter in the present species. In other respects there is a very great resemblance, for the spine at the wrist of the cheliped is exactly alike, and even the small tubercle at the base of this spine and at the anterior margin of the wrist occurs in both species; again, the fingers of the chelae are likewise much depressed and the teeth at the cutting margin of the fixed finger show much the same disposition; the upper border of the palm is in *Pt. spinicarpus* likewise transformed into a compressed, rather sharp lobe [1]). There seems to be some difference in the abdomen of the ♂, which is generally of a more narrow shape in *Pt. altimanus*; that of *Pt. spinicarpus* as depicted by ORTMANN [2]) is probably inexact, as the terminal segment presents an unnaturally elongated and asymmetrical shape, but DE MAN states, that it resembles that of *Pt. dentatus* and the abdomen of the latter [3]) is decidedly much broader, with the lateral margins more

1) Miss RATHBUN quotes the absence of this lobe in ORTMANN's species as a difference between the two species, but both ORTMANN and afterwards DE MAN state, that the palm is compressed above.

2) Zool. Jahrb., Syst., Bd 7, 1894, pl. 23, f. 13*a*.

3) Weber's zool. Erg. Reise niederl. Ost-Indien, Bd 2, 1892, pl. 18, f. 9*b*.

strongly convergent forward, the terminal segment is more triangular, and the penultimate segment longer than the preceding one.

The measurements of the ♂ given below nearly exactly agree with those of a specimen of *Pt. spinicarpus* measured by DE MAN [1]).

Dimensions in mm.:

| | ♂ | ♀ |
|---|---|---|
| Distance between external orbital angles | 16.75 | 14.75 |
| Distance between tips of postero-lateral teeth | 20.25 | 17.5 |
| Length of carapace | 19.5 | 17.— |
| Breadth of anterior margin of front | 8.5 | 7.25 |
| Length of chela | 17.— | — |
| Height of palm | 9.— | — |
| Breadth of ischium of ext. maxillipeds. | 1.8 [2]) | 1.8 [2]) |
| Breadth of exognath of ext. maxillipeds | 2.5 [2]) | 1.7 [2]) |
| Breadth of base of abdomen | 8.25 | — |
| Breadth of base of penultimate segment of abdomen | 4.4 [2]) | — |
| Length of penultimate segment of abdomen | 2.6 [2]) | — |
| Length of terminal segment of abdomen | 3.3 [2]) | — |
| Length of meropodite of penultimate pair of legs | 11.— | — |
| Breadth of meropodite of penultimate pair of legs | 3.25 | — |
| Length of carpo- + propodite of penultimate pair of legs | 11.5 | — |
| Length of dactylus of penultimate pair of legs | 7.5 | — |

2. *Ptychognathus affinis* de Man.

1895. *Ptychognathus affinis* de Man. Zool. Jahrb., Syst., Bd 9, p. 97, Bd 10, 1898, pl. 28, f. 21.

Stat. 115. Kwandang Bay, north coast of Celebes. 11 sp. juv. (all ♂), in river.
Stat. 179. Kawa Bay, west coast of Ceram. 1 ♂.

The original specimen from Atjeh was not full-grown, and this circumstance induced DE MAN to presume, that perhaps this species was only a young stage of *Pt. spinicarpus*, with which it shows the nearest affinity; though the exognath of the external maxilliped in *Pt. affinis* is only slightly broader than the ischium, but twice as broad as the ischium in *Pt. spinicarpus*, this difference might be perhaps accounted for by the well-known fact that the exognath in species of *Ptychognathus* is proportionally narrower in young individuals than in the adult ones. A large specimen of the present species, even exceeding the Atjeh-specimen of DE MAN, was caught by the "Siboga" and distinctly demonstrates, that *Pt. affinis* is a valid species, for the width of the exognath of the external maxilliped is only slightly more than that of the ischium and much less than in *Pt. spinicarpus*. Besides, in DE MAN's species the tooth at the inner angle of the wrist of the cheliped is proportionally shorter and somewhat falciform, and the horizontal line near the under border of the palm is much more distinct.

1) Zool. Jahrb., Syst., Bd 9, 1895, p. 93.
2) Measured under microscope.

Dimensions in mm. of the adult ♂:

| | |
|---|---|
| Distance between ext. orbital angles | 18.— |
| Distance between postero-lateral teeth of carapace | 21.25 |
| Length of carapace | 19.25 |
| Breadth of anterior margin of front | 9.5 |
| Length of chela | 11.— |
| Height of palm | 5.75 |
| Breadth of ischium of ext. maxillipeds | 1.9 [1] |
| Breadth of exognath of ext. maxillipeds | 2.2 [1] |
| Breadth of base of penultimate segment of abdomen | 5.1 [1] |
| Length of penultimate segment of abdomen | 2.4 [1] |
| Length of terminal segment of abdomen | 3.4 [1] |

As DE MAN rightly remarks, the chelae of the ♂ are remarkably feebly developed and present in this respect female characters.

3. *Ptychognathus riedelii* (A. Milne-Edwards).

1868. *Gnathograpsus riedelii* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 4, p. 182, pl. 27, f. 1—5.
1892. *Ptychognathus riedelii* de Man. Weber's zool. Erg. Reise niederl. Ost-Indien, Bd 2, p. 321.
1895. *Ptychognathus riedelii* de Man. Zool. Jahrb., Syst., Bd 9, p. 91.
1900. *Ptychognathus andamanica*? Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 404.
1902. *Ptychognathus andamanica*? Alcock. Ill. Zool. "Investigator", Crust., prt 10, pl. 65, f. 3.

Subsp. *pilosus* de Man.

1892. *Ptychognathus riedelii* var. *pilosa* de Man. Weber's zool. Erg. Reise niederl. Ost-Indien, Bd 2, p. 323.

Stat. 33. Bay of Pidjot, east coast of Lombok. 1 ♂ (entirely broken into fragments).
Stat. 131. Karakelang, Talaut Islands. Reef. 2 ♂.

*Pt. riedelii* is at once distinguished from all other species of the genus by the brush of stiff hairs at the under face of the tip of the fixed finger. On account of this character DE MAN considers [2]) *Pt. andamanicus* Alcock to be identical with the species of MILNE-EDWARDS, though ALCOCK does not mention a tuft of hairs at the outer angle of the wrist of the chelipeds, which tuft is observed by DE MAN (1892). But this tuft is very inconspicuous, especially in the ♀, the only sex ALCOCK could examine, and even in the ♂ of the "Siboga" collection it is scarcely indicated, and may be completely wanting at one side in some cases.

The "Siboga" specimens belong to the subsp. *pilosus*, in which the outer surface of the fingers of the cheliped bears a tuft of very long hairs, whereas the chelae are glabrous in the typical species. The latter has been found at Celebes, the Andamans, Flores and Atjeh, the subspecies at Flores, where it occurred together with the typical species, in freshwater.

The flattened, compressed shape of the chelae, that are very high in the ♂, and the remarkably broad exognath of the external maxillipeds (twice as broad at least as the ischium) are additional characters of this species.

1) Measured under microscope.
2) Proc. Zool. Soc. London, 1905, p. 543, note.

4. *Ptychognathus pusillus* Heller.

1865. *Ptychognathus pusillus* Heller. Reise "Novara", Crust., p. 60.
1889. *Ptychognathus pusillus* de Man. Zool. Jahrb. Syst., Bd 4, p. 440.
1892. *Ptychognathus pusillus* de Man. Weber's zool. Erg. Reise niederl. Ost.-Indien, Bd 2, p. 325.
1894. *Ptychognathus pusillus* Ortmann. Zool. Jahrb. Syst., Bd 7, p. 712.
1895. *Ptychognathus pusillus* de Man. Zool. Jahrb., Syst., Bd 9, p. 99, Bd 10, 1898, pl. 28, f. 22.
1900. *Ptychognathus pusilla* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 405.
1905. *Ptychognathus pusillus* de Man. Proc. Zool. Soc. London, 1905, p. 537, pl. 17, f. 1—5.
nec *Ptychognathus pusillus* de Man. Notes Leiden Mus., v. 5, 1883, p. 161, (= *Pt. polleni* de Man).
nec *Ptychognathus pusillus* de Man. Archiv. Naturgesch., Jahrg. 53, 1., 1888, p. 383 (= *Pt. barbatus* A. Milne-Edwards).

Stat. 33. Bay of Pidjot, east coast of Lombok. 1 ♂, in river.

This species has been obscurely known till 1895, when DE MAN redescribed the type specimen. Only in 1905 DE MAN made known the ♂ and his very detailed diagnosis renders a fresh description useless.

*Pt. pusillus* is, according to DE MAN, very nearly related to *Pt. barbatus*, but in the former species the exognath of the external maxillipeds is narrower and in the ♀ does not even attain the width of the ischium; the carapace is more narrowed anteriorly and is somewhat more granular; the anterior margin of the front is bordered by a double row of granules in both species, but this row is confluent in the middle in the case of *Pt. barbatus*, whereas in HELLER's species both rows are separated throughout [1]).

The present species ranges from the Nicobars to Christmas Island, Flores and even to Fiji.

The only specimen is not adult. The distance between the external orbital angles (8 mm.) somewhat exceeds the length of the carapace (7.5 mm.), which is contrary to DE MAN's measurements (1905, p. 541); the maximum breadth is 9.25 mm.

5. *Ptychognathus guijulugani* Rathbun. Pl. 4, Fig. 6.

1914. *Ptychognathus guijulugani* Rathbun. Proc. U. S. Nat. Mus., v. 47, p. 71.

Stat. 131. Karakelang, Talaut Islands. 1 ♂.

This small species, recently described by Miss RATHBUN, has a much flattened, smooth carapace, the various regions of which are scarcely separated one from another and none of them inflated. The cervical groove is concave forward, scarcely distinct in the middle; cardiac, intestinal and branchial regions are not separated off, the latter regions, as usual, declivous, towards the postero-lateral angles of the carapace, but these sloping portions are not very well defined above and bordered by a somewhat sharp ridge only in their posterior part. Mesogastric area of a triangular shape; epigastric region divided by a faint but broad longitudinal sulcus, parting from the interspace between the epigastric lobes; hepatical and branchial

1) KINGSLEY (Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 204) declares the two species to be identical and records *Pt. pusillus* from Mauritius.

regions not separated. The whole surface is not granular, but everywhere punctate, with some larger pits symmetrically distributed. Front somewhat deflexed, resembling that of *Pt. barbatus* and *Pt. pusillus*, but the anterior margin is still more sinuous (fig. 6*a*), with the median lobes broader and more prominent, and a single, but rather thick row of granules [1]), looking as if it consists of two entirely contiguous rows; lateral lobes subrectangular, obtuse; the width of the front, as Miss RATHBUN remarks, is half the greatest breadth of the carapace, lying between the tips of the first or second pair of epibranchial teeth. Upper orbital margin slightly oblique, granular, without fissure marking the transition to lateral margin of the front. External orbital angles slightly prominent, acute, with the lateral margins (that are as long as those of the following teeth) diverging backward and ending posteriorly in a triangular, distinct sinus; anterior epibranchial teeth somewhat pointed, lateral margins subparallel, followed at either side of the carapace by a very minute tooth, behind which the lateral margins are converging backward.

Bases of antennules separated by a very broadly-triangular nasal lobe; epistome very short, almost linear, crenulate at posterior margin; inner suborbital lobe obtusely-triangular; peduncles of antennae contiguous to, but not coalesced with, the lateral angles of the front.

Miss RATHBUN already states, that the exognath of the external maxillipeds is somewhat broader than the ischium, more so in the ♂ than in the ♀; the ischium does not increase in width towards it anterior margin, and the auricle of the merus is very large (fig. 6*c*).

The chelipeds of the ♂ are equal in size and unusually stout and bulky. Arm unarmed, granular at outer surface, and hairy along upper and inner edge. Wrist flattened above, with inner margin somewhat sharpened and bent rectangularly towards the palmar joint. Palm much inflated; length of chela equal to distance between external orbital angles; fixed finger straight, with five teeth at the cutting margin: two very small ones near the somewhat spooned extremity, preceded by two much larger, conical ones and one smaller tooth; movable finger much curved, so that a wide gap is left between the bases of the fingers, cutting margin irregularly crenulate, but none of the teeth attaining the size of the two large ones on the opposite finger; palm higher than long, smooth, but marked on the outer surface with numerous white patches, that are narrower and longitudinally disposed near the superior border, which is rounded, not keeled. The gap between the fingers is filled at the outer surface by a thick patch of hairs, as occurs in many other species of *Ptychognathus*; these hairs extend halfway on the fingers (fig. 6*b*).

The walking legs are nearly hairless, only some hairs being observed at the posterior border of the slightly flattened propodites and on the dactyli. Meropodites unarmed, with a subdistal rectangular prominence at anterior margin, and $3^1/_2$ times as long as broad, as long as carpo- and propodite together, save in the last pair of legs, in which, as is usual, the propodite is very short and subcircular; the dactyli present nothing remarkable.

The "Siboga" collected this specimen not far from the original locality (Guijulugan, Negros, Philippines).

1) Miss RATHBUN on the contrary denies the existence of a granulate row.

Dimensions in mm.[1]):

| | | |
|---|---|---|
| Distance between external orbital angles | | 9.3 |
| Maximum breadth of carapace | | 10.8 |
| Length of carapace | | 8.8 |
| Width of anterior margin of front | | 5.3 |
| Horizontal length of chela | | 9.9 |
| Height of palm | | 5.5 |
| Breadth of exognath of external maxillipeds | | 1.4 |
| Breadth of ischium of external maxillipeds | | 1.1 |
| Breadth of base | of penultimate segment of abdomen | 2.2 |
| Length | of penultimate segment of abdomen | 1.1 |
| Length of terminal segment of abdomen | | 1.7 |
| Length of meropodite | of penultimate pair of legs | 6.2 |
| Breadth of meropodite | of penultimate pair of legs | 1.7 |
| Length of carpo- + propodite | of penultimate pair of legs | 6.2 |
| Length of dactylus | of penultimate pair of legs | 3.3 |

## **Pyxidognathus** A. Milne-Edwards.

A detailed discussion of this genus, together with the description of a new species, is now under press and will be published in the "Zool. Meded. Mus. Leiden".

No representatives were collected by the "Siboga" expedition.

## **Utica** White.

1847. *Utica* White. Proc. Zool. Soc. London, 1847, p. 86.

In the shape of the much flattened carapace and of the prominent front the genus much resembles *Ptychognathus*, but the merus of the external maxillipeds is not at all auriculate at outer angle and the exognath is much narrower than the ischium.

White knew only a single species; two species were added by A. Milne-Edwards (1873), two by Haswell (1882) and two by de Man (1895). With exception of both species of Haswell all are living in freshwater.

Key to the species:

1. Two sharp epigastric ridges ("lobes protogastriques" A. Milne-Edwards) . . . . . 2
   No epigastric ridges present . . . . . 3
2. Antero-lateral teeth of carapace acute; external orbital angle as long as following tooth . . . . . *U. barbimana* A. Milne-Edw.[2])
   Antero-lateral teeth of carapace rectangular; external orbital angle somewhat longer than following tooth and directed somewhat inward . . . . . *U. borneensis* de Man[3])

1) Measured under microscope.

2) Nouv. Arch. Mus. Paris, t. 9, 1873, p. 297, pl. 14, f. 4. Hab. New Caledonia.

3) Zool. Jahrb., Syst., Bd 9, 1895, p. 118, Bd 10, 1898, pl. 28, f. 25. Hab. Pontianak (Borneo). De Man himself admitted

3. Protogastric and mesogastric region inflated, with a large, cup-shaped ridge (the ridge being broad and longitudinal on the mesogastric region and anteriorly bifurcating into two narrower, somewhat wavy ridges, directed towards the orbits); across the cardiac and the branchial regions there runs a thick, prominent, transverse ridge. Chelipeds (of ♂) much hairy; outer surface of palm with a thick tuft of hairs, and without a longitudinal ridge near under border of palm . . . . . *U. nausithoe* de Man

Carapace without prominent ridges. Cheliped of ♂ with a longitudinal ridge near under border of palm . . . . 4

4. Angles of front rounded. Meropodites of walking legs (2d and 3d pair) about 3 times as long as broad . . . . *U. glabra* A. Milne-Edwards [1])

Angles of front acute. Meropodites of walking legs (2d and 3d pair) about 5 times as long as broad . . . . . *U. gracilipes* White [2]).

1. *Utica nausithoe* de Man.

1895. *Utica nausithoe* de Man. Zool. Jahrb., Syst., Bd 9, p. 113, Bd 10, 1898, pl. 28, f. 24.

Stat. 131. Karakelang, Talaut Islands. 1 ♂, 1 ♀.

The ♂ is quite perfect and entirely agrees with DE MAN's diagnosis; the ♀ is unfortunately much damaged, like DE MAN's, as nearly all the limbs are wanting. There remains only the left cheliped, which is very small and weak, without a longitudinal ridge on the palm, and entirely covered by a short pubescence; the fingers are as long as the upper border of the palm and finely toothed at the cutting margins. The velvety pubescence on the prominent ridges of the carapace, which renders them so conspicuous in the case of the ♂, is entirely wanting in the ♀, though here the ridges themselves are quite as strongly developed.

Both specimens attain about the size of the ♂ measured by DE MAN. The original specimens came from Atjeh. Most likely the species is fluviatile, like the majority of its congeners.

that his species might be identical with *U. barbimana* or *U. setosipes* Haswell, but the descriptions of both A. MILNE-EDWARDS and HASWELL (Cat. Austral. Crust., 1882, p. 101, pl. 2, f. 2) are too fragmentary and insufficient. In comparing the figures of HASWELL and of DE MAN it may be observed that the dactyli in the last pair of legs are as long as the propodites in the case of *U. setosipes*, but very much shorter in *U. borneensis*. Besides, *U. setosipes* is a marine species, found at the sea-shore of Port Denison (Queensland); *U. borneensis* most likely lives in freshwater. Of *U. barbimana* only the ♂, of both other species here named only the ♀ is known, so that the chelipeds, that are widely different in the two sexes, do not offer us distinctive characters.

1) Nouv. Arch. Mus. Paris, t. 9, 1873, p. 296, pl. 14, f. 3. Hab. New Caledonia.

2) Proc. Zool. Soc. London, 1847, p. 86; ADAMS and WHITE, Voy. "Samarang", Crust., 1850, p. 53, pl. 13, f. 6; H. MILNE-EDWARDS, Ann. Sc. Nat. (3) t. 20, 1853, p. 177, pl. 7, f. 4—4*a*. Hab. Philippines.

There remains one species, *U. crassimana* Haswell (Cat. Austral. Crust., 1882, p. 102, pl. 2, f. 3) which I am unable of including in this key. Epigastric ridges are not mentioned, and carapace and chelipeds are smooth, but there is a tuft of hair filling up the gap of the fingers and a longitudinal ridge on the fixed finger, not continued on the palm. The hairiness of the palm excludes the identity of this species with *U. glabra* (of both species ♂ are known); besides, *U. crassimana* is a marine species, like *U. setosipes*, and found at the same locality in Queensland; neither is HASWELL's species identical with *U. gracilipes*, on account of the much shorter legs. HASWELL himself compares his species with *U. barbimana*, but the carapace of the Australian species is much broader (the width distinctly exceeding the length), the chelae are larger and the fingers more curved than in *U. barbimana*.

## Pseudograpsus H. Milne-Edwards.

1837. *Pseudograpsus* (part.) H. Milne-Edwards. Hist. Nat. Crust., t. 2, p. 81.
nec *Pseudograpsus* Dana. Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 248 (= *Brachynotus*).

*Pseudograpsus* is nearly related to *Ptychognathus* and to *Brachynotus* (= *Heterograpsus*). From the former genus it is distinguished by the exognath of the external maxillipeds being, even in the ♂, much narrower than the ischium; from *Brachynotus* by the merus of these maxillipeds being slightly auricular, not subquadrate. Besides, the antero-lateral teeth of the carapace are separated by partly closed fissures, not open sinuses, in *Pseudograpsus*, but nearly always defined by triangular, sometimes even very deep, incisions in the two other genera.

Notwithstanding the said difference between the meri of the external maxillipeds of *Pseudograpsus* and *Brachynotus*, it remains a matter of difficulty to separate the genera. Comparing f. i. the external maxilliped of *Ps. erythraeus* Kossmann [1]), which has been referred by the author himself and by Nobili [2]) to *Pseudograpsus*, but by Kingsley [3]) to *Heterograpsus* (= *Brachynotus*) we may observe, that in this species the merus is even less auriculate than in the case of *Brach. elongatus* A. Milne-Edwards as depicted by Miss Rathbun [4]), whereas we should expect the reverse to be the case. For the rest it is not unlikely, that, notwithstanding the localities are widely distant from each other (Red Sea and Pacific Islands) the two species are identical, as they agree in all important particulars; in Milne-Edwards' species only the carapace is more narrowed posteriorly.

The "Siboga" collected a small species of *Pseudograpsus*, that I am not able to refer to any of the known species, besides two already known ones of the genus.

Key to the species:

1. Large species (carapace attaining a breadth of 40 mm. and even more) of a chestnut colour. Cervical groove very deep, semi-circular. Three last joints of walking legs thickly clothed with a short, velvety fur of black hairs . . . . 2
   Small species (carapace attaining a breadth of about 15 mm.) of a white colour. Cervical groove indistinct, nearly straight. Three last joints of walking legs naked. . . . . 3
2. Postero-lateral margins of carapace not sharp, disappearing backward. Outer surface of chela (of ♂) near base of fingers with a tuft of very long, black hairs. Anterior margins of walking legs heavily fringed. . . . . *Ps. setosus* (Fabricius) [5])

1) Zool. Erg. Reise Küstengeb. d. Roten Meeres, Bd 1, 1877, pl. 3, f. 15.
2) Ann. Sc. Nat. (9) t. 4, 1906, p. 321.
3) Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 209.
4) *Hemigrapsus elongatus*, Mem. Mus. comp. Zool. Harvard Coll., v. 35, n° 2, 1907, pl. 7, f. 2.
5) Literature: Kingsley, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 205. Rumphius already knew this species, designating it as "*Cancer barbatus*" (Amboinsche Rariteitkamer, 1705, p. 26, pl. 10, n° 2) and it has been generally referred to under the latter name, but this name is inadmissable, being pre-Linnean. Distinct localities of this apparently fluviatile species are given by Heller (Reise "Novara", Crust., 1865, p. 52, Nicobars) and de Man (Weber's zool. Erg. Reise niederl. Ost-Indien, Bd 2, 1892, p. 317, Flores, and Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, 1902, p. 506, Ternate). The Leiden Museum possesses a fine ♂ collected at Amboyna by Ludeking (1864).

Postero-lateral margins of carapace keeled and granulate, continued till bases of penultimate pair of legs. Chela (of ♂) smooth and naked, movable finger compressed. Meropodites of walking legs not at all or slightly fringed . . . . . *Ps. crassus* A. Milne-Edwards

3. Lateral margins of carapace subparallel in their posterior half. Two distinct epigastric lobes behind the front. Chela (of ♂) with a small tuft of hairs filling the gap between the fingers, inner surface naked . . . . . *Ps. albus* Stimpson

Lateral margins of carapace distinctly converging backward in their posterior half. No epigastric lobes. Chela (of ♂) with a tuft of hairs at inner surface. . . . . 4

4. Antero-lateral teeth of carapace rather distinct, flattened. Front not prominent . . . . . *Ps. erythraeus* Kossmann [1])

Antero-lateral teeth of carapace scarcely indicated. Front laminar, prominent . . . . . *Ps. laniger* n. sp.

1. *Pseudograpsus crassus* A Milne-Edwards.

1868. *Pseudograpsus crassus* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 4, p. 176, pl. 26, f. 6—10.

1892. *Pseudograpsus crassus* de Man. Weber's zool. Erg. Reise niederl. Ost-Indien, Bd 2, p. 317.

1902. *Pseudograpsus crassus* de Man. Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, p. 506.

Stat. 131. Karakelang, Talaut Islands. 5 ♂, 3 ♀.

Of this species a sufficient description is given by MILNE-EDWARDS, but a few additional remarks may not be superfluous. The carapace is punctate, but the lateral and anterior margins are granulate; these granules are large and disposed in a single row along the sharply-keeled lateral margins, behind the epibranchial teeth, but for the rest they form a narrow stripe of irregularly-arranged and smaller granules; the anterior border of the front and the supra-orbital borders are much thickened. Infra-orbital border deeply fissured, but the orbit is closed beneath by a long crenulate crest, parting inwardly from the epistome, as in *Ps. setosus*. The auricle at the external angle of the merus of the external maxillipeds is distinctly present, but does not extend much sideways, the anterior margin has a deep notch in the middle, at the outer part of which the carpus is inserted; the exognath is somewhat narrower than half the width of the ischium.

The meropodites of the chelipeds, that are very stout and subequal in the ♂, are entirely unarmed, somewhat granulate at the inner margin, near which a deep fissure runs alongside in which long hairs are implanted; the wrist is broader than long in dorsal view, with the inner angle subrectangular and slightly depressed; the palm is very high, longer than

1) L. c. p. 61, pl. 1, f. 5, pl. 3, f. 14—15; *Heterograpsus erythraeus* Ortmann, Denkschr. med.-naturw. Gesellsch. Jena, Bd 8, 1894, p. 55.

the fingers; the latter are compressed, especially in the ♂, somewhat spooned at the tip, and armed with obtuse, conical teeth at the inner margins, these teeth being equal at the movable finger, but very unequal in size at the opposite side. As is usual in the genus, the young ♂ and the ♀ present a longitudinal ridge on the outer surface of the chela, running from the carpal joint to the tip of the fixed finger, but this ridge nearly entirely disappears in the adult ♂.

The species has been first collected in Celebes and afterwards at Flores and Halmaheira, but, as far as could be made out, only in freshwater; at Halmaheira it was met with even at a height of 2500 feet. The specimens of the "Siboga" apparently lived on the reef and are consequently marine.

Among the dried Crustacea of the Leiden Museum I found 5 adult ♀ of this species, collected by v. SIEBOLD in Japan, but not mentioned by DE HAAN in his Fauna Japonica; they were labelled *Heterograpsus* sp. I am not aware, that this species has ever been recorded from this locality so distant from the Moluccas.

2. *Pseudograpsus albus* Stimpson.

1858. *Pseudograpsus albus* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 104.
1873. *Pseudograpsus albus* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 314, pl. 18, f. 2.
1880. *Pachystomum philippinense* Nauck. Zeitschr. wiss. Zool., Bd 34, p. 67 (f. DE MAN, Zool. Jahrb. Syst., Bd 2, 1887, p. 719).
1886. *Pseudograpsus albus* Miers. Rep. "Challenger", Brachyura, p. 262.
1888. *Pseudograpsus albus* de Man. Arch. Naturgesch., Jahrg. 53, 1., p. 382.
1889. *Pseudograpsus albus* de Man. Zool. Jahrb., Syst., Bd 4, p. 440.
1895. *Pseudograpsus albus* de Man. Zool. Jahrb., Syst., Bd 9, p. 111.
1907. *Pseudograpsus albus* Stimpson. Smithson. Inst., Miscell. Coll., v. 49, p. 127.
1907. *Pseudograpsus albus* Rathbun. Mem. Mus. comp. Zool. Harvard Coll., v. 35, n° 2, p. 32.

Stat. 64. Tanah Djampeah, Flores Sea. 1 ♀.
Stat. 172. Gisser Island, south-east of Ceram. 1 ♂.

As DE MAN observed (1889, under the head of *Ptychognathus pusillus*) the ♀ of this species may be easily confused with the same sex of HELLER's species, but the carapace is proportionally broader, the antero-lateral teeth are more pronounced and the maxillipeds are rather widely different in *Ptychognathus pusillus*.

*Pseudograpsus albus* ranges from Japan through the East-Indian Archipelago to New Caledonia and Fiji. It seems to be entirely a marine species.

3. *Pseudograpsus laniger* n. sp. Pl. 5, Fig. 1.

Stat. 64. Tanah Djampeah, Flores Sea. 1 ♂.
Stat. 127. Taruna Bay, Great Sangir Island. 1 ♀.

This new species much resembles *Ps. erythraeus* Kossmann, but the antero-lateral teeth of the carapace are scarcely indicated and the front is laminar, prominent.

The length of the carapace is about exactly equal to the width between the anterior epibranchial teeth. The surface is evenly and regularly vaulted in both directions, but the postero-lateral regions of the carapace are somewhat more sloping near the margin. The

cervical groove is nearly straight, and from either end parts a very short branchio-cardiac furrow; these are the only sulci of the carapace, which is everywhere finely punctate and does not show distinct regions; at the level of the branchio-hepatic grooves we may observe a very slightly inflated portion of an oval shape. Epigastric lobes, so easily to be detected in the large species and also in the small *Ps. albus*, are wholly absent, and the front, that is exactly half as wide at the anterior margin as the maximum breadth of the carapace, passes without any demarcation into the epigastric region; it is laminar and prominent, projecting some way beyond the bases of the antennulae (fig. 1*a*), slightly sinuous in the middle of the fore margin and with rounded lateral angles; the side margins are concave, and the transition between them and the supra-orbital margin, which latter is directed straightly outward but somewhat sinuous, is marked by a very shallow and inconspicuous notch. External orbital angle very slightly projecting, directed inward, with the lateral margin straight, and about $1^1/_2$ times as long as that of the following tooth; anterior epibranchial tooth very little prominent, only marked by a sudden alteration of the direction of the lateral margins of the carapace, as these are diverging backward anteriorly, but behind the anterior epibranchial teeth the margins are converging backward, so that at the level of these teeth the carapace attains its maximum breadth; a second epibranchial tooth is most inconspicuous, and behind it the margins are even somewhat concave, the posterior margin of the carapace is shorter than the width of the anterior margin of the front. Antennules and antennae do not present anything remarkable; the infra-orbital margin is deeply fissured and beneath it a suborbital crest runs obliquely backward, this crest proves to be microscopically striated at strong magnification. Pterygostomial regions with an oblique ridge on either side; the dorsal part of the region finely reticulate. Nasal plate triangular; epistome distinct, but very short. External maxillipeds essentially resembling those of *Ps. albus*: merus with a large and distinct auricle at the outer margin and a deep notch at the anterior border, exognath two-thirds of the width of the ischium (fig. 1*a*).

The abdomen of the ♂ is somewhat narrower than that of the other species: whereas in *Ps. setosus*, *crassus* and *albus* the lateral margins only slightly converge towards the terminal segment and the penultimate segment is abruptly narrowed anteriorly, the abdomen of *Ps. laniger* presents more distinctly converging, even somewhat concave, side margins, that are not convex at the anterior part of the penultimate segment. The terminal joint is oblong, with the tip much rounded, longer than broad at the base and longer than the penultimate segment, which itself is again longer than the antepenultimate one (fig. 1*d*).

The chelipeds are unequal, the left being slightly the larger. Meropodite short and thick, scarcely projecting beyond the carapace, unarmed, with rounded margins, but the inner margin fringed with a row of woolly hairs, increasing in length distally. Wrist globular at upper surface, with inner angle subrectangular; immediately beneath inner margin, especially anteriorly, a tuft of similar woolly hairs is found, and, if the cheliped be folded, these hairs cover the proximal naked portion of the inner surface of the palm. Chela bulky, palm longer than fingers and rather high; upper border rounded: a large tuft of woolly hairs covers the distal portion of the inner surface

of the palm, but is scarcely visible in the gap between the fingers; at the outer surface of the chela a white line, no ridge, runs along from the carpal joint to the tip of the fixed finger; fingers conical, not compressed, somewhat gaping at the base, tips slightly spooned, cutting margins finely and irregularly toothed; movable finger much curved, fixed finger straight. The outer surface of the arm, the upper side of the wrist and the whole chela are covered with a fine reticulated sculpture, resembling a multitude of minute scales (fig. 1 *b* and *c*).

The walking legs much resemble those of *Pseudograpsus albus*: the meropodites are likewise slender, cylindrical, unarmed at the anterior margin, but provided with a few hairs at the base; for the rest the legs are completely hairless, even at the propodites and the dactyli; the latter are falciform, longitudinally grooved and with horny tips, they are as long as the preceding propodites, even in the case of the posterior legs, whereas they are considerably shorter in *Ps. albus*.

This species is certainly nearest to *Ps. erythraeus*, which also presents a woolly fur at the inner surface of the chela, but the lateral teeth of the carapace are distinctly separated by fissures, which are entirely absent in *Ps. laniger*; the front of KOSSMANN's species is deflexed, and the anterior margin does not project; of the external maxillipeds the merus is less distinctly auriculate, the ischium more rapidly narrows towards the base and is proportionally broader than the narrow exognath.

*Heterograpsus elongatus* A Milne-Edwards [1]), a cotype of which, received from the author himself in 1878, is in the Leiden Museum, at once reveals the very great resemblance between this and the present species. The general shape of the carapace, the antero-lateral teeth and the prominent front are entirely the same; besides, the dimensions of the carapace of *Pseudograpsus laniger* completely correspond with those of *Hemigrapsus elongatus* measured by Miss RATHBUN [2]). Unfortunately the New-Caledonian specimen of MILNE-EDWARDS is very much damaged, none of the legs being entire, nearly all of them detached, and the chelae completely wanting. Nevertheless, what is left of the right cheliped presents the same squamiform, meandrian sculpture as in the new species; the inner and upper border of the meropodite is likewise fringed with long hairs, and even the tuft of hairs at the inner angle of the carpopodite is present in the same way. The maxillipeds again are exactly alike, and I should not hesitate to declare the two specimens absolutely identical, were it not for some slight differences: 1° the general colour of *Heterograpsus elongatus* is a chestnut-brown, with numerous rounded patches of a somewhat lighter colour on the carapace; that of *Pseudograpsus laniger* is entirely ivory-white; 2° the suborbital ridge is distinctly and roughly granular in the former, but only microscopically striate in the latter species; and 3° the walking legs are fringed with rather long hairs along the margins in the species of MILNE-EDWARDS, but entirely hairless in the new species (save for some few bearded hairs quite near the base, and along the proximal part of the anterior border, of the meropodite).

In concluding I am disposed to consider *Heterograpsus elongatus* and *Pseudo-*

1) Nouv. Arch. Mus. Paris, t. 9, 1873, p. 317, pl. 17, f. 5.
2) See note 4 p. 97.

*grapsus laniger* very nearly related, but not identical species. As to the former species, the auriculate shape of the merus of the external maxillipeds, which peculiar shape is even more strongly pronounced than in *Pseudograpsus erythraeus*, forbids in my opinion its being included in *Heterograpsus* and points on the contrary to *Pseudograpsus*. In genuine *Heterograpsus* (or better *Brachynotus*) the external margin of this merus is regularly convex.

Dimensions [1]) in mm. of *Pseudograpsus laniger*:

| | | ♂ |
|---|---|---|
| Distance between external orbital angles | | 7.6 |
| Distance between tips of anterior epibranchial teeth | | 8.9 |
| Width of front at anterior margin | | 4.4 |
| Length of carapace | | 8.3 |
| Posterior margin of carapace | | 3.75 |
| Length of terminal segment | of abdomen of ♂ | 1.2 |
| Width at base of terminal segment | | 1.— |
| Length of penultimate segment | | 1.— |
| Width at base of penultimate segment | | 1.4 |
| Length of antepenultimate segment | | 0.8 |

## Brachynotus de Haan.

1835. *Brachynotus* de Haan. Fauna Japon., Crust., p. 34.
1837. *Cyclograpsus* (part.) H. Milne-Edwards. Hist. nat. Crust., t. 2, p. 79.
1849. *Heterograpsus* Lucas. An. art. de l'Algérie, t. 1, p. 18.
1851. *Hemigrapsus* Dana. Amer. Journ. Sc. (2) v. 12, p. 288.
1851. *Pseudograpsus* (part.). Dana. Proc. Ac. Nat. Sc. Philadelphia, p. 248.

De Haan founded *Brachynotus* (subgenus of *Grapsus*) on "*Gonoplax*" *sexdentatus*, described in the beginning of the nineteenth century by Risso [2]). This *Brachynotus* was described afterwards by H. Milne-Edwards [3]) and by Heller [4]) under the same name, but Hilgendorf [5]) in 1882 tried to prove, that the type of the genus *Brachynotus* was identical with that of *Heterograpsus*, which was described by Lucas in 1849 under the same specific name, and de Man [6]) afterwards, by examining the typical specimens of de Haan from the Mediterranean, could confirm this hypothesis. So both generic names being founded on the same species should be considered synonyms.

The confusion is considerably increased by the fact, that H. Milne-Edwards in 1853 added [7]) a species, "*Heterograpsus sexdentatus*", from New Zealand to the genus, and accordingly changed the name of Lucas' species into *H. lucasi*, under which latter designation the Mediterranean species has been described by Heller [8]) in 1863. But Hilgendorf [9]) is undoubtedly

1) Measured under the microscope.
2) Hist. nat. de l'Eur. mér., t. 5, 1826, p. 13.
3) Ann. Sc. Nat. (3) t. 18, 1852, p. 161, pl. 4, f. 26.
4) Crust. d. südl. Eur., 1863, p. 101—102.
5) Sitzungsber. Gesellsch. naturforsch. Freunde Berlin, 1882, p. 68.
6) Zool. Jahrb., Syst., Bd 9, 1895, p. 121.
7) Ann. Sc. Nat. (3) t. 20, 1853, p. 192, pl. 7, f. 7. This is the species, formerly (1837) referred by the author to *Cyclograpsus*.
8) Crust. d. südl. Eur., 1863, p. 105, pl. 3, f. 5—6.
9) Sitzungsber. Gesellsch. naturforsch. Freunde Berlin, 1882, p. 70.

right in retaining the name *Brachynotus sexdentatus* for the Mediterranean species and in altering consequently "*Heterograpsus sexdentatus*" of H. MILNE-EDWARDS from New Zealand into *Brachynotus edwardsii*.

MIERS [1]) in 1886 proposes to retain a subgenus *Heterograpsus* for the Indo-Pacific species, on account of the H-shaped cervical groove distinguishing these species as a whole from the single Mediterranean species; DE MAN [2]), however, proves this difference to be unstable and is disposed rather to take the shape of the front (quadrilobate in the Mediterranean, simple in the Indo-Pacific species) as the base of distinction between *Brachynotus* and *Heterograpsus*. But this latter criterium again turns out to be unreliable, for in the Japanese *B. sanguineus* DE HAAN the front is strongly quadrilobate, at least in adult specimens.

As to *Hemigrapsus*, the only difference pointed out by DANA is the more or less distinct notching of the inner margin of the external maxillipeds, and this indeed seems to be of doubtful value. STIMPSON [3]) referred DANA's two new species of *Hemigrapsus* to the genus *Cyrtograpsus* Dana, but A. MILNE-EDWARDS [4]), KINGSLEY [5]) and HASWELL [6]) all agree in declaring *Hemigrapsus* absolutely identical with *Heterograpsus*. For some unknown reason Miss RATHBUN in several publications persists in using DANA's name *Hemigrapsus*.

The sharply-defined and pointed antero-lateral teeth of the carapace and the non-auriculate shape of the merus of the external maxillipeds distinguish this genus from *Pseudograpsus*.

It is remarkable, that this Pacific genus has one solitary species in the Mediterranean, whereas it is wholly absent in the Atlantic. It is represented at the coasts of Japan and China, of California and Chile, in Indonesia, but chiefly in Australian and New Zealandian waters. The Malay Archipelago affords only one single species (*B. harpax* Hilgendorf), for another species, as has been remarked a few pages before (under the head of *Pseudograpsus laniger*), viz. *Heterograpsus elongatus* H. Milne-Edwards, recorded by NOBILI [7]) from Borneo, should in my opinion be included in *Pseudograpsus* (see p. 101—102). Not a single species, as far as I know, has been found in the Indian Ocean, but *B. harpax* is again found in the Red Sea.

The rather numerous species of *Brachynotus* may be divided into two distinct groups: one, very small, in which three minute teeth, behind the external orbital angle, are observed and another, much larger, with only two very large and usually depressed teeth behind this angle. H. MILNE-EDWARDS' attempts to subdivide the species of the latter group on account of the presence or absence of longitudinal crests on the palm of the chela have remained unsuccessful.

Though no species of this genus were collected by the "Siboga", I have taken this occasion to review shortly the various species, for the collection of the Leiden Museum is rather rich in this regard. I believe the best discrimination of the species is to be found in the

1) Rep. "Challenger", Brachyura, 1886, p. 264.
2) Zool. Jahrb., Syst., Bd 9, 1895, p. 123.
3) Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 125.
4) Nouv. Arch. Mus. Paris, t. 4, 1868, p. 177.
5) Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 207—209.
6) Cat. Austral. Crust., 1882, p. 100—101.
7) Boll. Mus. Torino, t. 18, n° 447, 1903, p. 25.

shape of the suborbital ridge, characters of the chelae being largely dependent on sexual differences, and consequently only of secondary importance.

Key to the Indo-Pacific species [1]):

1. Two teeth behind external orbital angle, large, generally depressed and acute. . . . . 2
   Three teeth behind external orbital angle, small, conical 9
2. Outer surface of palm with four prominent longitudinal crests. . . . . *B. pallipes* (H. Milne-Edwards) [2])
   Outer surface of palm with a single crest or smooth . 3
3. Suborbital ridge [3]) with a few (2—6) tubercles, at least in ♂ 4
   Suborbital ridge finely or coarsely serrulate or striate . 6
4. Outer margins of ext. orbital angles diverging backward 5
   Outer margins of ext. orbital angles converging backward; epigastric ridges sharp; ant. margin of front notched in the middle; epibranchial teeth very acute, narrow, not flattened; suborbital ridge four-lobed in ♂, regularly granular in ♀. Ischium of ext. maxilliped with a fine longitudinal sulcus immediately near inner margin; merus nearly quadrate, with outer margin straight. . *B. harpax* Hilgendorf [4])
5. Suborbital ridge notched beneath cornea of the eye, and thickened at either end of this notch; a third tubercle placed farther back. Palm of cheliped in ♂ thickly clothed with hairs at inner surface and between bases of fingers . . . . . *B. penicillatus* (de Haan) [5])
   Suborbital ridge with 4 low tubercles, directed forward. Palm of cheliped of ♂ with a sharply circumscribed patch of hairs at inner surface, no hairs between bases of fingers *B. oregonensis* (Dana) [6])

1) I am unable to include *B. longitarsis* (*Heterograpsus l.* Miers, Proc. Zool. Soc. London, 1879, p. 37, pl. 2, f. 3; Ortmann, Zool. Jahrb., Syst., Bd 7, 1894, p. 715) here, as the infra-orbital ridge is not described. The species is recorded from Japanese and Corean waters.

2) *Pseudograpsus pallipes* H. Milne-Edwards, Hist. nat. Crust., t. 2, 1837, p. 82; *Heterograpsus pallipes* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 194; Haswell, Cat. Austral. Crust., 1882, p. 100. Hab. Australia. The character of the chela here noted is also observed in the ♀ of *B. sexdentatus* from the Mediterranean.

3) This ridge is apparently used in the same way as in *Macrophthalmus* and *Metaplax*; according to Koelbel (Wiss. Erg. Reise Széchenyi in Ost-Asien 1877—1880, Bd 2, 1898, p. 571), the ridge produces a stridulating sound when being rubbed against a horny crest on the inner surface of the arm of the cheliped.

4) Sitzungsber. Gesellsch. naturforsch. Freunde Berlin, 1892, nº 4, p. 38; de Man, Zool. Jahrb., Syst., Bd 9, 1895, p. 124. Bd 10, 1898, pl. 29, f. 26; Nobili, Ann. Sc. Nat. (9) t. 4, 1906, p. 320; Pesta, Denkschr. Ak. Wiss. Wien, Bd 88, 1912, p. 62. textfig. 5. Hab. Red Sea, Atjeh and Upolu (Samoah).

5) *Grapsus (Eriocheir) penicillatus* de Haan, Faun. Japon., 1835, p. 60, pl. 11, f. 6; *Heterograpsus p.* Stimpson, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 104; de Man, Notes Leiden Mus., v. 1, 1879, p. 71; Kingsley, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 209; *Brachynotus (Heterograpsus) p.* Miers, Rep. "Challenger", Brachyura, 1886, p. 264; *Heterograpsus p.* Ortmann, Zool. Jahrb., Syst., Bd 7, 1894, p. 714; *Brachynotus p.* Koelbel, Wiss. Erg. Reise Széchenyi 1877—1880, Bd. 2, 1898, p. 570, pl. 1, f. 5—9; Stimpson, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 126. Hab. Japan and Hongkong.

6) *Pseudograpsus oregonensis* Dana, Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 248; Dana, U. S. Expl. Exp., Crust., 1852, p. 534, pl. 20, f. 6; *Heterograpsus o.* Stimpson, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 104; Kingsley, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 209; Stimpson, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 126. Hab. west coast of North America.

| | | |
|---|---|---|
| 6. | Suborbital ridge very minutely transversely striate, to the naked eye apparently quite smooth; anterior margin of front sinuous. Carapace and legs covered with minute red spots. Chelipeds of ♂ quite naked . . . . . | *B. sanguineus* (de Haan) [1] |
| | Suborbital ridge granulate or finely serrate . . . . . | 7 |
| 7. | Suborbital ridge entirely serrate, the serrations being directed forward; anterior parts of carapace covered with small and numerous tubercles. Whole animal covered with minute red spots. Upper margins of meropodites of walking legs thickly fringed with long hairs . . . . . | *B. crenulatus* (H. Milne-Edwards) [2] |
| | Suborbital ridge with obtuse granules. Carapace with the regions indistinct, smooth and glabrous. Walking legs entirely naked or with widely separated hairs . | 8 |
| 8. | Chela of ♂ naked at inner surface. Meropodites of ambulatory legs with a rectangular prominence near distal end of anterior margins; dactyli conical, not depressed . . . . . | *B. edwardsii* Hilgendorf [3] |
| | Chela of ♂ with a patch of hairs at inner surface of fixed finger. Meropodites of ambulatory legs unarmed at anterior margins; dactyli much flattened . . . . | *B. nudus* (Dana) [4] |
| 9. | Ambulatory legs almost hairless, at least the meropodites | 10 |
| | Ambulatory legs fringed with hairs, especially last pair . | *B. affinis* (Dana) [5] |

1) *Grapsus (Grapsus) sanguineus* de Haan. Faun. Japon., 1835, p. 58, pl. 16, f. 3; *Heterograpsus s.* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 193; *Heterograpsus maculatus* H. Milne-Edwards, ibid., p. 193; *Hemigrapsus crassimanus* Dana, Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 250; DANA, U. S. Expl. Exp., Crust., 1852, p. 349, pl. 22, f. 4; *Heterograpsus sanguineus* de Man, Notes Leiden Mus., v. 1, 1879, p. 70; KINGSLEY (part.), Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 208; THALLWITZ, Abhandl. Mus. Dresden, Bd 3, nº 3, 1891, p. 41; *Brachynotus s.* Koelbel, Wiss. Erg. Reise Széchenyi 1877—1880, Bd. 2, 1898, p. 571, pl. 1, f. 7; ORTMANN, Zool. Jahrb., Syst., Bd 7, 1894, p. 714; *Hemigrapsus s.* Rathbun, Proc. U. S. Nat. Mus., v. 26, 1903, p. 24; *Hemigrapsus crassimanus* Rathbun, Bull. U. S. Fish Comm. for 1903, v. 23, 1906, p. 839; *Heterograpsus sanguineus* Stimpson, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 126. Hab. Japan and Hawaii.

2) *Cyclograpsus crenulatus* H. Milne-Edwards, Hist. nat. Crust., t. 2, 1837, p. 80; *Grapsus c.* Guérin, Voy. "Coquille", Crust., t. 2, 1838, p. 15; *Hemigrapsus c.* Dana, U. S. Expl. Exp., Crust., 1852, p. 349, pl. 22, f. 3; *Heterograpsus c.* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 193; *Heterograpsus barbigerus* Heller, Verhandl. zool.-bot. Gesellsch. Wien, 1862, p. 522; *Heterograpsus barbimanus* Heller, Reise "Novara", Crust., 1865, p. 53, pl. 4, f. 5; *Heterograpsus crenulatus* Kingsley, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 208; FILHOL, Miss. île Campbell, t. 3, 1885, p. 389; DE MAN, Notes Leiden Mus., v. 13, p. 53; *Hemigrapsus c.* Rathbun, Proc. U. S. Nat. Mus., v. 38, 1910, p. 589. Hab. Australia, New Zealand and Chile.

3) *Cyclograpsus sexdentatus* H. Milne-Edwards, Hist. nat. Crust., t. 2, 1837, p. 79; *Heterograpsus sexdentatus* H. Milne-Edwards (nec LUCAS, 1849 = *Gonoplax sexdentatus* Risso 1826), Ann. Sc. Nat. (3) t. 20, 1853, p. 192, pl. 7, f. 7; *Hemigrapsus s.* Dana, U. S. Expl. Exp., Crust., 1852, p. 348, pl. 22, f. 2; *Heterograpsus sanguineus* Heller (nec *Grapsus sanguineus* de Haan), Reise "Novara", Crust., 1865, p. 52; *Heterograpsus sexdentatus* Kingsley, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 207; *Brachynotus Edwardsii* Hilgendorf, Sitzungsber. Gesellsch. naturforsch. Freunde Berlin, 1882, p. 70; *Heterograpsus sexdentatus* Haswell, Cat. Austral. Crust., 1882, p. 100. Hab. Australia and New Zealand.

4) *Pseudograpsus nudus* Dana, Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 249; Dana, U. S. Expl. Exp., Crust., 1852, p. 335. pl. 20, f. 7; *Heterograpsus marmoratus* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 193; *Heterograpsus nudus* Stimpson, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 104; ORTMANN, Zool. Jahrb., Syst., Bd 7, 1894, p. 715. Hab. west coast of North America.

5) *Hemigrapsus affinis* Dana, Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 250; DANA, U. S. Expl. Exp., Crust., 1852, p. 350, pl. 22, f. 5; TARGIONI-TOZZETTI, Viaggio "Magenta", Crost., 1877, p. 117, pl. 7, f. 5; *Heterograpsus a.* Kingsley, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 209; *Hemigrapsus a.* Nobili, Boll. Mus. Torino, t. 16, nº 402, 1901, p. 12. Hab. Patagonia and Argentinia.

10. Anterior part of carapace strongly granulate. front little deflexed, anterior margin straight; postfrontal lobes four. Meropodites of walking legs with subrectangular prominence near distal end of anterior margin; hind margin of propodites and dactyli subspinulose . . . *B. octodentatus* (H. Milne-Edw.) [1]

Anterior part of carapace finely granulate; front strongly deflexed, anterior margin nearly straight; postfrontal lobes two. Meropodites of walking legs with acute spine near distal end of anterior margin . . . . . *B. spinosus* (H. Milne-Edwards) [2]

## Acmaeopleura Stimpson.

1858. *Acmaeopleura* Stimpson. Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 105.

This genus is very little known; the carapace is subcircular, unarmed at the margins and resembling that of *Cyclograpsus*, but the external maxillipeds are widely different, merus and ischium being subequal in length, and broader than long. Two very minute species, the carapaces of which attain only a length of a few millimetres, belong to this genus.

Key to the species:

Carapace widest near the antero-lateral angles; suborbital crest 3- or 4-lobed. Chelipeds smooth externally, hands with some strong granules at the inner surface, and the gap between the fingers filled with hairs externally . . . . . *A. parvula* Stimpson [3]

Carapace widest at the middle. Chelipeds granulate . . . . . *A. rotunda* Rathbun [4]

## Eriocheir de Haan.

1835. *Eriocheir* (part.) de Haan. Faun. Japon., Crust., p. 32.
1853. *Eriochirus* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 20, p. 176.

This genus much resembles *Brachynotus*, but the breadth of the front is only one-third of the maximum width of the carapace, there are usually three teeth behind the external orbital angle, and the front is usually strongly 4-lobed. The genus only inhabits Japan and China.

Key to the species:

1. Anterior margin of front 4-lobed; surface of carapace uneven. Chelae thickly clothed with hairs . . . . . 2

1) *Cyclograpsus octodentatus* H. Milne-Edwards, Hist. nat. Crust., t. 2, 1837, p. 80; *Heterograpsus o.* H. Milne-Edwards, Ann. Sc. Nat., (3) t. 20, 1853, p. 194; *Grapsus inornatus* Hess, Arch. Naturgesch., Jahrg. 31, 1, p. 148, pl. 6, f. 11 (f. DE MAN, Zool. Jahrb., Syst., Bd 2, 1887, p. 699); *Heterograpsus c.* Kingsley, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 209; HASWELL, Cat. Austral. Crust., 1882, p. 101; *Grapsus inornatus* Haswell, Ibid., p. 98. Hab. Tasmania, King Island, Sydney.

2) *Heterograpsus spinosus* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 194; A. MILNE-EDWARDS, Journ. Mus. Godeffroy, t. 3, 1874, p. 82; KINGSLEY, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 210; DE MAN, Notes Leiden Mus., v. 13, 1891, p. 56, pl. 4, f. 15; ORTMANN, Zool. Jahrb., Syst., Bd. 7, 1894, p. 715. Hab. Vanikoro Island, Upolu and East Australia.

3) Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 105; Smithson. Inst., Miscell. Coll., v. 49, 1917, p. 130, pl. 11, f. 4. Hab. Ousima (Japan).

4) Proc. Biol. Soc. Washington, v. 22, 1909, p. 109; K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n° 4, 1910, p. 327, text. 10. Hab. Gulf of Siam.

| | |
|---|---|
| Front short, anterior margin with only two minute notches, near external angles, median lobe broad and straight; surface of carapace little uneven; a granulate ridge runs inward from the third lateral tooth; external maxillipeds strongly gaping, ischium and merus narrow and long, the latter auriculate . . . . . | *E. leptognathus* Rathbun [1]) |
| 2. Lateral margins of carapace nearly straight; anterior margin of front indistinctly four-lobed, median sinus very shallow | *E. rectus* Stimpson [2]) |
| Antero-lateral margins of carapace diverging backward; anterior margin of front distinctly four-lobed . . . . | 3 |
| 3. Carapace flattened; anterior margin of front divided into four lobules, the external ones of which are sharply angular; posterior (4th) antero-lateral tooth of carapace very minute. Chelae (of ♂) wrapped in a thick hairy muff | *E. japonicus* de Haan [3]) |
| Carapace vaulted, with four sharply-edged epigastric lobes; anterior margin of front with four acute teeth; posterior (4th) antero-lateral tooth of carapace not much smaller than the preceding one. Chelae (of ♂) much less clothed with hairs . . . . . | *E. sinensis* H. Milne-Edwards [4]) |

## Subfam. Sesarminae.

This subfamily is characterized by the front being nearly always strongly deflexed, so that the postfrontal lobes are sharply-ridged anteriorly, and by the external maxillipeds being provided by an obliquely-longitudinal hairy ridge on the ischium and especially on the merus, which latter is generally not auriculate and mostly of an oval shape. In the typical representatives of this subfamily (*Sesarma*, *Metasesarma*, *Sarmatium*) the pterygostomian regions and side-walls of the carapace are covered with a fine reticulation of hairy lines and the terminal segment of the abdomen of the ♀ is strongly pushed into the preceding segment.

Key to the Indo-Pacific genera:

| | |
|---|---|
| 1. Pterygostomian regions and side walls of carapace covered with a fine reticulation of intercrossing hairy lines . . | 2 |

1) Proc. U. S. Nat. Mus., v. 46, 1913, p. 353, pl. 33, f. 2—3. Hab. Shanghai.

2) *Eriochirus rectus* Stimpson, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 103; *Eriocheir r.* Kingsley, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 210; *Eriochirus r.* Stimpson, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 125. Hab. Macao (China).

3) Faun. Japon., Crust., 1835, p. 59, pl. 17; *Eriochirus j.* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 176; *Eriocheir j.* Kingsley, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 210; Ortmann, Zool. Jahrb., Syst., Bd 7, 1894, p. 716; *Eriocheir j.* Rathbun, Proc. U. S. Nat. Mus., v. 26, 1903, p. 24; *Eriochirus j.* Stimpson, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 124. Hab. Japan.

4) *Eriochirus sinensis* H. Milne-Edwards, Ann. Sc Nat. (3) t. 20, 1853, p. 177; Arch. Mus. Paris, t. 7, 1853, p. 146, pl. 9, f. 1; Heller, Reise "Novara", Crust., 1865, p. 52; *Eriocheir s.* Kingsley, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 210; *Eriochirus s.* Koelbel, Wiss. Erg. Reise Széchenyi 1877—1880, Bd 2, 1898, p. 572. Hab. Shanghai.

Pterygostomian regions and side of carapace not presenting reticulating lines . . . . . 5

2. Antennae entering the orbits . . . . . 3

Antennae excluded from the orbit; if the inner suborbital lobe does not meet the front, the postfrontal lobes are scarcely separated one from another. . . . . 4

3. Front nearly always sharply deflexed; carapace flattened, often covered with numerous tufts of hairs . . . . *Sesarma* Say

Front obliquely deflexed, postfrontal lobes rounded anteriorly; carapace vaulted, naked . . . . . *Sarmatium* Dana

4. Carapace naked, with subregions scarcely indicated; antero-lateral margins not toothed. . . . . *Metasesarma* H. Milne-Edwards

Carapace covered with a short fur; antero-lateral margins twice emarginated behind external orbital angle . . . *Clistocoeloma* A. Milne-Edwards

5. Distance between external orbital angles decidedly exceeding length of carapace; antero-lateral margins with two distinct teeth behind external orbital angle. Eye-stalks rather long, about as long as the width of the front, which latter rapidly narrows anteriorly. Sub-orbital crest in ♂ divided into obtuse lobules and extending far behind the orbit. Ambulatory legs long and slender . . . . . *Metaplax* H. Milne-Edwards

Distance between external orbital angles not much exceeding length of carapace; antero-lateral margins entire or toothed. Eye-stalks much shorter than the width of the front. Ambulatory legs not particularly slender. . 6

6. Lateral margins of carapace arched, very feebly toothed or entire . . . . . *Cyclograpsus* H. Milne-Edwards

Lateral margins of carapace always distinctly toothed. . 7

7. Width of fronth between eye-stalks much less than half the distance between external orbital angles, with the anterior margin passing imperceptibly into the much oblique inner margins of the orbits. Abdomen of ♂ broadest at 3$^{d}$ segment . . . . . 8

Width of front half the distance between external orbital angles, with the lateral angles of the anterior margin distinct. Abdomen of ♂ regularly tapering from base to tip . . . . . *Paragrapsus* H. Milne-Edwards

8. Lateral margins of carapace much convex in their entire course . . . . . *Chasmagnathus* de Haan

Lateral margins of carapace subparallel in posterior half *Helice* de Haan

## Metasesarma H. Milne-Edwards.

1853. *Metasesarma* H. Milne-Edwards. Arch. Mus. Paris. t. 7, p. 158.

A detailed account of all the species of this genus and of *Sesarma*, *Sarmatium* and *Clistocoeloma* has been given by me in "Zool. Med. Mus. Leiden, v. 3, 1917, p. 127—260, so that a rapid glance over the species belonging to the said genera may be sufficient and no key is needed.

1. *Metasesarma rousseauxi* H. Milne-Edwards.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 212.

Stat. 19. Labuan Tring, west coast of Lombok. 1 ♀ with eggs and 3 very young ♂.
Stat. 61a. Adonara Island, east of Flores. 1 ♀ with eggs and a ♂ juv.

The ♀ apparently attain maturity at very different age or they will pass through several breeding periods: the ♀ from Stat. 19 has a length of carapace of about 15 mm., that from Stat. 61a is only 10 mm. long. The carapace is yellowish, with some scarlet-red markings and the front darkish-red; the chelae are whitish.

2. *Metasesarma aubryi* A. Milne-Edwards.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 211.

Stat. 133. Lirung, Talaut Islands. 2 ♂, 1 ♀ with eggs.
Stat. 180. Pulu Kelang, between Ceram and Buru, 1 ♀ not ad., in river.

The carapace of the adult ♂ is of a beautiful violet colour and the chelae are brightly red, with the fingers whitish.

## Sesarma Say.

1817. *Sesarma* Say. Journ. Ac. Nat. Sc. Philadelphia, 1817, p. 442.

This genus is distributed through all tropical seas and contains more species than all the remaining genera of Grapsidae taken together. Four subgenera are accepted: *Holometopus* H. Milne-Edwards, *Sesarma* Say, *Parasesarma* de Man and *Chiromantes* Gistel (= *Perisesarma* de Man).

1. *Sesarma (Holometopus) elongata* A. Milne-Edwards. Pl. 5, Fig. 2.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 149.

Stat. 169. Atjatuning, west coast of New Guinea. 1 ♂ juv., on reef.
Stat. 174. Bay of Waru, north-east coast of Ceram. 1 ♀ ad., on reef.

The apparently very rare species is at once distinguished by the remarkably foliaceous meropodites of the walking legs, by the very short dactyli and by the row of transverse tubercles on the back of the movable finger of the chela. DE MAN [1]) has examined the original

1) Notes Leiden Mus., v. 14, 1892, p. 256.

specimen (♂) of the Paris Museum. It is a pity, that my only adult specimen is a ♀, in which the specific characters, especially with regard to the chelipeds, are less distinct than in the ♂.

The carapace is much flattened and the regions are tolerably distinct; the four postfrontal lobes are sharply defined, and the groove between the median lobes, that are $1^1/_3$ times as broad as the lateral ones, is very deep; there is an indistinct posterior lobe on each lateral postfrontal lobe, which latter is separated from the inner orbital border by a furrow; the mesogastric region is somewhat inflated, small and rounded posteriorly, anteriorly it extends with an elongated process into the groove between the median postfrontal lobes; the cardiac region is short, of the same breadth as the mesogastric area; the intestinal region rather indistinctly defined laterally by the branchio-intestinal furrows; the hepatic regions are flattened, somewhat roughened, the outer branchial areas provided with a few oblique lines, the largest of which is situated posteriorly and passes above the bases of the last walking legs. The whole carapace is punctate, and nearly all of the pits are beset with a small tuft of hairs; these tufts are largest on the anterior margin of the postfrontal lobes and on the protogastric region, very minute on the branchial regions, where they are arranged in oblique rows, following the usual branchial lines; on the intestinal area they are elongated-transverse.

The front is vertically deflexed and not visible from above; it is four times as high as broad, roughened by tubercles, of which a transverse row of 3—4 large ones is placed immediately beneath the median postfrontal lobes; the lateral margins are somewhat convergent anteriorly and the anterior margin presents a large, shallow sinus in the middle, somewhat less broad than the lateral lobes, that slope obliquely backward to the subrectangular lateral angles of the front. The front between the eye-stalks occupies nearly 60 % of the distance between the external orbital angles, and the latter distance is slightly less than the length of the carapace in the median line[1]). The supra-orbital border is straight and oblique in its inner, concave in its outer part and the external orbital angle is acute, prominent, directed straight forward. The lateral margins of the carapace, that present two very indistinct thickenings or traces of epibranchial teeth behind the external orbital angle, are not exactly parallel, but very slightly concave in the middle of their course and diverging backward towards the bases of the second pair of walking legs, so that the greatest breadth of the carapace exceeds its length. The posterior margin is (in the ♀) distinctly less broad than the front.

The epistome is of the usual shape in *Sesarma*, but there is a quadrate depression in the middle of the surface and the posterior margin projects in the median line, where a ridge parts backward on the palate.

The abdomen of both sexes presents nothing remarkable.

The chelipeds are equal in size, both in the young ♂ and in the ♀. In the latter sex they are short, equal in length to the greatest width of the carapace. Meropodite in ♀ short, margins sharp, upper border convex, with a small, subrectangular prominence near the distal end,

1) In the young ♂, however, the reverse is the case.

outer surface with transverse rugosities, external margin crenulate, ending in a sharp tooth at the carpal articulation, under and inner surface smooth, but the latter with two longitudinal rows of hairs, inner margin concave in its greater part, but in the distal third armed with a triangular tooth, followed by two much smaller ones. Carpopodite roughened above, outer margin regularly arched, inner angle rectangular, not rounded, between this angle and the articulation with the palm the margin is crenulate. Chelae small, palm much shorter than the fingers and higher than long; outer surface covered with sharpened granules which at the proximal under part of the surface are obliquely-longitudinal; upper margin marked by a finely-striated line[1]); the proximal half of which is convex, the distal half straight and ending above the base of the movable finger into a sharp tooth, inner surface of palm with a few widely-scattered granules but dorsally there are two short and indistinct rows running parallel with the transversely-grooved line along the upper margin; fingers not flattened, longer than palm, not gaping, distinctly spooned at the tips, and nearly straight, with some conspicuous pits, in each of which a short hair is placed; back of movable finger with a longitudinal row of more than 30 transverse tubercles, the proximal 10—12 of which, however, present the shape of the usual sharp granules and gradually pass into short, transverse ridges, that run along nearly the whole length of the finger, but disappear on the distal third[2]); cutting margin of this finger with four rather distant, large teeth and in the interspaces between the second and third and between the third and fourth 2—4 much smaller ones; on the opposite border there are proximally two or three rounded teeth, then follows a large subdivided tooth, that is again followed by two acute teeth alternating with two very minute ones.

The ambulatory legs are not particularly elongate, but remarkable by their very bulky and broadened meropodites. First and fourth pair of legs not much unequal in length, but much shorter than the median pairs. Meropodites somewhat less than twice as long as broad, with sharp and crenulate margins; greatest width found near the distal end, upper surface transversely rugose, anterior margin convex, ending in a sharp subdistal tooth, posterior margin perfectly straight. Carpo- and propodite together as long as the meropodite, flattened, somewhat roughened, but quite hairless, like the meropodite, except at the hind end of the propodite, where, especially in the case of the first pair of legs short hairs are found; propodite longer than the carpopodite; dactyli very short, about one-third of the length of the preceding segment, slightly curved, with six longitudinal rows of hairs.

The general colour of this species is a reddish-yellow; the legs of the young ♂ bear traces of darker cross-bands.

In my paper on *Sesarma* I have treated separately of *S. elongata* and *S. latifemur* Alcock, but I am almost convinced, that Alcock's species is not specifically distinct. In comparing the figure in the Ill. Zool. "Investigator"[3]) with mine, there is such a complete agreement in

1) According to de Man there is a pectinated crest on the palm of the adult ♂.

2) It is of course to be expected, that this character of the chela is much more pronounced in the adult ♂; de Man mentions 40 of them in the type specimen but in the young ♂ at my disposal scarcely any trace of these tubercles is found.

3) Crust., prt 10, 1902, pl. 66, f. 2.

all the essential points, that scarcely any doubt about the identity of the two species is justified. ALCOCK in his description states, that his *S. latifemur* is "closely related" to *S. elongata*, but he gives no points of difference and compares his species only with *S. taeniolata* White. From his too short diagnosis we infer that the ♂ has a short transverse beaded crest on the inner surface of the palm, and that the back of the movable finger bears a "milled crest" consisting of about 40 transverse ridges; the finely-striated upper margin of the palm is not mentioned, but something like it is indicated in his figure.

This species has been first recorded by A. MILNE-EDWARDS from the west coast of Madagascar. ORTMANN afterwards collected it near Dar-es-Salaam and gave some specific characters. ALCOCK mentioned his *S. latifemur* from the Andamans. The discovery of this species by the "Siboga" on the coast of Ceram and of New Guinea considerably extends its known distribution. It seems to be entirely a marine species.

From the measurements taken by DE MAN, ORTMANN and ALCOCK, it appears, that the ratio by which the length of the carapace surpasses the distance between the external orbital angles increases with advancing age, and this is corroborated by my material: in the very young ♂ the latter dimension even exceeds the former.

Dimensions in mm.:

| | ♂ [1] | ♀ |
|---|---|---|
| Distance between external orbital angles | 9.7 | 26.5 |
| Maximum breadth of carapace | 10.4 | 30.— |
| Length of carapace in the median line | 9.1 | 27.— |
| Width of front between eye-stalks | 5.3 | 15.25 |
| Posterior margin of carapace | 4.6 | 12.— |
| Length of cheliped | — | 31.— |
| Length of penultimate pair of walking legs | — | 55.— |
| Length of meropodite of penultimate pair of legs | 8.8 | 22.— |
| Breadth of meropodite of penultimate pair of legs | 4.2 | 11.5 |
| Length of carpopodite in the median line of penultimate pair of legs | — | 11.— |
| Length of propodite in the median line of penultimate pair of legs | — | 16.5 |
| Length of dactylus of penultimate pair of legs | — | 7.— |

2. *Sesarma (Holometopus) villosa* A. Milne-Edwards.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 208, pl. 17, f. 2.

Stat. 64. Tanah Djampea, Flores Sea. 2 ♀ juv.

3. *Sesarma (Sesarma) amphinome* de Man.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 129.

Stat. 179. Bay of Kawa, west coast of Ceram. 1 ♂ juv. on shore.

4. *Sesarma (Sesarma) gracilipes* H. Milne-Edwards.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 154.

Stat. 180. Pulu Kelang, between Ceram and Buru. 1 ♂, in river.

1) Measured under the microscope.

5. *Sesarma (Sesarma) impressa* H. Milne-Edwards.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 158.

Stat. 53. Bay of Nangamessi, north coast of Sumba. 1 ♂ juv., in river.
Stat. 131. Karakelang, Talaut Islands. 1 ♀ with eggs.

6. *Sesarma (Sesarma) atrorubens* Hess.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 131.

Stat. 180. Pulu Kelang, between Ceram and Buru. 1 ♂ juv., in river.

7. *Sesarma (Sesarma) lafondi* Jacquinot et Lucas.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 164, pl. 15, f. 1.

Stat. 131. Karakelang, Talaut Islands. 1 ♀.

8. *Sesarma (Sesarma) modesta* de Man.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 175, pl. 16, f. 1.

Stat. 131. Karakelang, Talaut Islands. 1 ♀

9. *Sesarma (Sesarma) palawanensis* Rathbun.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 183, pl. 16, f. 2.

Stat. 4. Djangkar, north-east coast of Java. 2 ♀.

10. *Sesarma (Sesarma) rotundata* Hess.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 193.

Stat. 133. Lirung, Talaut Islands. 2 ♂, 2 ♀ (one of these with eggs).

11. *Sesarma (Parasesarma) calypso* de Man.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 140.

Stat. 19. Labuan Tring, west coast of Lombok. 1 ♂ juv.
Stat. 33. Bay of Pidjot, east coast of Lombok. 1 ♂ juv. in river.
Stat. 131. Karakelang, Talaut Islands. 1 ♂, 1 ♀ with eggs.
Stat. 133. Lirung, Talaut Islands. 1 ♂.

DE MAN described a subspecies *kükenthali* of this species, the ♂ of which is distinguished by the following features:

1° the length of the penultimate segment of the abdomen is distinctly less than half the width at the posterior margin.

2° the tubercles on the back of the movable finger are less in number (9), larger and more elongated longitudinally; on the proximal slope of each tubercle there are not 3—4, but 5—6, transverse lines.

3° the pectinated crest nearest to the base of the movable finger consists of 19—20, not 25, horny teeth.

4° the transverse crest on the inner surface of the palm is absent.

The subspecies was obtained at Halmaheira, while the typical specimens came from Atjeh. In agreement with this distribution the two large ♂ from the Talaut Islands wholly answer to the description of the Moluccan subspecies, but the young ♂ from Lombok belongs to the typical form.

On a greenish or greyish-blue ground colour the adult animal is mottled by numerous blotches and specks of a reddish-violet hue, especially the inner branchial regions. The chelae are violet in their proximal part, but the distal part of the palm and the fingers are yellowish. The numerous specimens from Nias, formerly examined by me, had the chelae always brightly red, and the same has been stated by DE MAN about his Atjeh specimens.

12. *Sesarma (Chiromantes) livida* A. Milne-Edwards.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 169.

Stat. 86. Dongala, west coast of Celebes. 1 ♂, 1 ♀ with eggs.

13. *Sesarma (Chiromantes) lenzii* de Man.

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 168.

Stat. 64. Tanah Djampeah, Flores Sea. 1 ♂ juv.

This small specimen does not wholly agree with DE MAN's description, neither that of 1895, nor that of 1902, especially with regard to the chelipeds. Firstly there is a transverse crest, consisting of 4—5 granules, on the inner surface of the palm, near the articulation of the movable finger. Secondly the back of this finger presents a greater number (18) of transverse tubercles, whereas in typical specimens only 13—14 are observed, but in the figure of DE MAN showing the chela in dorsal view[1]) we may count as many as 16 tubercles. The pectinated crests on the palm are shorter, the foremost of them consisting of 8 horny teeth, followed by another row of only 5—6 teeth, but it is probable, that these teeth increase in number with advancing age.

The walking legs of my specimens are somewhat more slender than depicted by DE MAN; the propodites of the penultimate pair are, according to the figure, only $2^1/_2$ times as long as broad, but in the text it is stated, that they are more slender and this agrees with my finds. Besides, these propodites appear to become more slender with advancing age, for in larger specimens (length of carapace 13—10 mm.) they are four times (or nearly so) as long as broad, but in smaller individuals (length of carapace 8.5 mm.) only three times[2]). In the "Siboga" specimen the length of carapace is 9.5 mm. and the said propodites are $3^1/_2$ times as long as broad.

1) Zool. Jahrb., Syst., Bd 10, 1898, pl. 30, f. 35*d*.

2) DE MAN, Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, 1902, p. 537.

14. *Sesarma (Chiromantes) bidens* (de Haan).

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 132.

Stat. 131. Karakelang, Talaut Islands. 4 ♂, 1 ♀ with eggs.

The two egg-bearing ♀ are of very different size, one being 17 mm., the other only 12.5 mm. long. The carapace of all the specimens is of a nearly uniform bluish-violet colour, the legs are mottled with blotches of the same hue on a greenish ground colour and the chelae are scarlet-red.

### Sarmatium Dana.

1851. *Sarmatium* Dana. Amer. Journ. Sc., v. 12, p. 288.
1853. *Metagrapsus* H. Milne-Edwards. Arch. Mus. Paris, t. 7, p. 160.

1. *Sarmatium punctatum* (A. Milne-Edwards).

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 221.

Stat. 131. Karakelang, Talaut Islands. 1 ♂.

In colour this species much resembles *Sesarma bidens* (from which of course it widely differs in many respects); the walking legs are, however, mottled with much larger and rounded reddish-violet blotches.

### Clistocoeloma A. Milne-Edwards.

1873. *Clistocoeloma* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 310.

1. *Clistocoeloma tectum* (Rathbun).

Literature: TESCH, Zool. Med. Mus. Leiden, v. 3, 1917, p. 222, pl. 17, f. 3.

Stat. 131. Karakelang, Talaut Islands. 1 ♂, 3 ♀ (one of these with eggs).

Though the 3 ♀ are all apparently adult, only one of them is bearing eggs. The characteristic black colour of the animal renders it very distinct.

### Metaplax H. Milne-Edwards.

1852. *Metaplax* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 18, p. 161.
1856. *Rhaconotus* Gerstaecker. Arch. Naturgesch., Jahrg. 21, p. 142.

The oblique piliferous ridge running diagonally across the merus and ischium of the external maxillipeds certainly places this genus among the *Sesarminae*, though MILNE-EDWARDS himself has preferred to regard *Metaplax* as closely related to his section "Gonoplacés vigils" containing such genera as *Macrophthalmus*, *Cleistostoma* etc. Consequently some subsequent authors ranged the genus among the Ocypodidae. DE MAN in 1888 was the first to recognize the identity of *Rhaconotus* to *Metaplax*, which former genus had been rightly referred by its author to the *Sesarminae*.

The species are in the possession of a "musical ridge" on the arm of the cheliped (in the ♂) and of a peculiarly-transformed infra-orbital margin, the mode of crenulation of which is of great systematic value; these characters, though not so constantly observed, are also shared by the genera *Helice* and *Chasmagnathus*, both established by DE HAAN, to which *Metaplax* is closely related.

The majority of the species inhabit mud-flats near the mouths of rivers in British India and the neighbouring islands, where they seem to be most numerous in individuals. One species inhabits China (Hongkong); it is aberrant by having the anterior margin of the meropodites of the walking legs not spinulose, but at most granulate. Towards the Indo-Malayan Archipelago only one species extends (*M. elegans* de Man), that has been observed at the coasts of Atjeh, of Borneo (Pontianak and Samarinda) and at Macassar. The "Siboga" collection did not contain a single representative of the genus.

Key to the species:

1. Carpo- and propodite of the walking legs spinulose along the anterior margin . . . . . *M. crenulata* (Gerstaecker) [1]
   Carpo- and propodite of the walking legs not spinulose along the anterior margin . . . . . 2
2. Number of lobules or teeth of the infra-orbital ridge of the ♂ 7—9 . . . . . 3
   Number of lobules of the infra-orbital ridge numerous, more than 20 . . . . . 4
3. Infra-orbital ridge with three large lobules in the orbital part. Abdomen of ♂ consisting of 7 free segments . . . . . *M. longipes* Stimpson [2]
   Infra-orbital ridge beginning near the epistome with 4—5 very small teeth, followed by two larger, rounded lobules, that are separated by a large interspace from three very small tubercles in the lateral or hind part of the ridge. 3th—5th segment of abdomen of ♂ partly fused . . . . . *M. indica* H. Milne-Edwards [3]
4. Lobules of infra-orbital ridge amounting to 25—30 5
   Lobules of infra-orbital ridge amounting to 40—60 (about 35 in ♀) . . . . . 6
5. Lobules of orbital portion very large (6 in the adult ♂), rapidly decreasing in size laterally and backward.

1) *Rhaconotus crenulatus* Gerstaecker, Arch. Naturgesch., Jahrg. 21, 1856, p. 142, pl. 5, f. 5; *Metaplax c.* de Man, Journ. Linn. Soc. London, v. 22, 1888, p. 156; Zool. Jahrb., Syst., Bd 4, 1889, p. 439; *M. crenulata* Alcock, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 435. Hab. Bay of Bengal.

2) Proc. Ac. Nat. Sc. Philadelphia, 1858. p. 97: KOELBEL, Wiss. Erg. Reise Szechenyi in Ost-Asien 1877—1880, Bd 2, 1898, p. 569, pl. 1, f. 1—4; STIMPSON, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 99. Hab. Hongkong.

3) Ann. Sc. Nat. (3) t. 18, 1852, p. 161; Arch. Mus. Paris, t. 7, 1855, pl. 11, f. 2: *M. indica* Alcock, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 432. Hab. Karachi (British India).

Arm of cheliped of ♂ short . . . . . *M. dentipes* (Heller) [1])

Lobules of orbital portion small (10—12 in number), gradually decreasing in size. Arm of cheliped of ♂ long, largely projecting beyond carapace . . . *M. distincta* H. Milne-Edwards [2])

6. Palm of the chela of the ♂ longer than high, large conical tooth of movable finger placed in the middle of the cutting margin. Meropodites of walking legs with several spines along upper margin. Meropodites of penultimate pair of legs in ♂ $3^1/_2$ times, in ♀ $2^1/_2$ times as long as broad. . . . . *M. elegans* de Man [3])

Palm of the chela of the ♂ as long as high, quadrangular tooth of movable finger placed near articulation. Meropodites of walking legs with only one subdistal tooth at upper margin. . . . . *M. intermedia* de Man [4])

## **Helice** de Haan.

1835. *Helice* de Haan. Fauna Japon., Crust., p. 28.

The genus *Helice* is certainly closely related to *Metaplax*, but the cephalothorax in the former genus is more convex, thicker; the chelae are stouter and the horizontal length of the palm is surpassed by its height; the meropodites of the walking legs, moreover, never carry a series of teeth along their upper margin, as is so frequently observed in *Metaplax*. The general appearance of the latter genus with its long eye-stalks, its rather narrow front, the anterior margin of which is not rounded, its regularly tapering abdomen, that is not broadened at the third segment, and its carapace usually narrowing backward is sufficiently different from that of *Helice*.

There is, on the other hand, still a great deal of confusion in the conception of the genera *Helice*, *Chasmagnathus* and *Paragrapsus*. ORTMANN [5]) is inclined to unite the two first named genera, and KINGSLEY [6]) declares *Paragrapsus* to be completely identical with *Chas-*

1) *Helice dentipes* Heller, Reise "Novara", Crust., 1865, p. 62, pl. 5, f. 5; *Metaplax d.* de Man, Journ. Linn. Soc. London, v. 22, p. 162, pl. 11, f. 1—3; ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 433; DE MAN, Rec. Ind. Mus., v. 2, prt 3, 1908, p. 219; RATHBUN, K. Dansk. Vid. Selsk. Skr. 7. Raekke, Afd. 5, n° 4, 1910, p. 329. Hab. Ceylon, Mergui Archipelago and several localities on the continent of British India, also in the Gulf of Siam.

2) Ann. Sc. Nat. (3) t. 18, 1852, p. 162, pl. 4, f. 27; DE MAN, Journ. Linn. Soc. London, v. 22, 1888, p. 158, pl. 10, f. 7—9; HENDERSON, Transact. Linn. Soc. London (2) v. 5, 1893, p. 391; *M. distincta* Alcock, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 432; *M. distinctus* Nobili, Boll. Mus. Torino, t. 18, n° 452, 1903, p. 23. Hab. Bombay, Madras, Pondichéry, Cocomada, Nicobars and Mergui Archipelago.

3) Journ. Linn. Soc. London, v. 22, 1888, p. 164, pl. 11, f. 4—6; *M. crassipes* (= ♀) de Man, WEBER's Zool. Erg. Reise niederl. Ost-Indien, Bd 2, 1892, p. 325, pl. 19, f. 12; *M. elegans* de Man, Zool. Jahrb., Syst., Bd 8, p. 596, pl. 14, f. 14 (abdomen); ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 434; NOBILI, Boll. Mus. Torino, t. 18, n° 447, 1903, p. 28; RATHBUN, K. Dansk. Vid. Selsk. Skr., 7. Raekke, Afd. 5, n° 4, 1910, p. 329. Hab. Mergui Archipelago, Godavari Delta (British India), Penang, Malacca, Atjeh, Pontianak, Samarinda, Macassar.

4) Journ. Linn. Soc. London, v. 22, 1888, p. 166, pl. 11, f. 7—9; *M. intermedia* Alcock, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 435. Hab. Mergui Archipelago, and Deltas of Godavari and Ganges.

5) Zool. Jahrb., Syst., Bd 7, 1894, p. 727.

6) Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 221.

*magnathus*. From this we should infer, that all three genera are really synonymous, but on comparing the type species of each genus it at once becomes obvious, that *Paragrapsus* H. Milne-Edwards, on account of the different shape of the front and of the abdomen of the ♂, is certainly distinct from *Chasmagnathus* de Haan. As to the differences between the two genera of DE HAAN, it may be said, that in *Helice* the lateral margins of the carapace are subparallel and sometimes slightly concave, but in *Chasmagnathus* convergent backward; for the rest, however, they nearly exactly agree in the shape of the front and in the toothing of the carapace, though there are some differences in the abdomen of the ♂, the relative length of the palm in proportion to its height and the shape of the external maxillipeds (see p. 123 under the head of *Helice subquadrata*).

Most of the species of the three genera are most obscurely known, and in some cases it is still impossible, without examining the typical specimens, to which of the genera they should be referred. As far as I can trace out, the genus *Helice* includes the following species [1]):

*H. tridens* de Haan
*H. latreilli* H. Milne-Edwards
*H. gaudichaudi* H. Milne-Edwards
*H. lucasi* H. Milne-Edwards [2])
*H. spinicarpa* H. Milne-Edwards
*H. crassa* Dana
*Chasmagnathus subquadratus* Dana
*Paragrapsus urvillei* H. Milne-Edwards [3])
*Paragrapsus gaimardi* H. Milne-Edwards
*H. leachi* Hess (= *H. pilimana* A. Milne-Edwards).

As to *H. latreilli* and *H. lucasi* I am quite at a loss how to discriminate these species, and DE MAN, who gave an excellent description of the former, has neither been able to separate the two species, though their habitats are widely apart, which would warrant specific distinctness. *Paragrapsus urvillei* is so insufficiently known, that I cannot include it into the following key:

1. Lateral margins of carapace nearly perfectly parallel, maximum breadth lying at external orbital angle, the side margins of which are parallel or even slightly converging backward and longer than those of anterior epibranchial teeth. Musical crest on arm of cheliped absent in both sexes . . . . . *H. crassa* Dana [4])

1) KINGSLEY (l. c. p. 219) still mentions a species "*H. gibba*" without mentioning the author's name and I have not succeeded in getting more information about it.

2) Ann. Sc. Nat. (3) t. 20, 1853, p. 190; FILHOL, Miss. île Campbell, t. 3, prt 2, 1885, p. 391; KINGSLEY (l. c. p. 220) identifies this species with *H. crassa*. Hab. New Zealand.

3) Ann. Sc. Nat. (3) t. 20, 1853, p. 196. Hab. Vanikoro Island.

4) Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 252; U. S. Expl. Exp., Crust., 1852, p. 367, pl. 23, f. 8; HELLER, Reise "Novara", Crust., 1865, p. 61; MIERS, Cat. Crust. New Zealand, 1876, p. 43; KINGSLEY, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 220; HASWELL, Cat. Austral. Crust., 1882, p. 107; MIERS, Rep. "Challenger", Brachyura, 1886, p. 269. Hab. New Zealand and Australia (Queensland and New South Wales).

Greatest breadth of carapace lying between tips of anterior or posterior epibranchial teeth . . . . . 2

2. Infra-orbital ridge modified into 16—18 large, transversely-striated tubercles. Musical crest on arm of cheliped in both sexes. From the notch between first and second epibranchial teeth a short granulate line runs inward. Large species from Japan . . . . . *H. tridens* de Haan [1])

Infra-orbital ridge, at least in ♂, consisting of a few elongate tubercles or finely and regularly serrulate . 3

3. Inner margin of wrist of cheliped with a longitudinal series of large spiniform teeth . . . . . *H. spinicarpa* H. Milne-Edw. [2])

Inner margin of wrist of cheliped with a longitudinal row of 7—8 sharp granules, increasing in size distally 4

4. Carapace and chelae strongly granulate. Infra-orbital ridge finely transversely striate . . . . . *H. gaudichaudi* H. Milne-Edw. [3])

Chelae nearly smooth, finely granulate or punctate . . 5

5. Breadth of carapace nearly equal to length. . . . . *H. gaimardi* (H. Milne-Edw.) [4])

Breadth of carapace distinctly exceeding length . . . 6

6. Anterior part of sternum, between abdomen and base of external maxillipeds hirsute. Some hairs between bases of fingers, externally . . . . . 7

Anterior part of sternum smooth, not hairy. No hairs between bases of fingers . . . . . *H. latreilli* (H. Milne-Edw.) [5])

7. ♂ with a rather large tuft of short hairs filling up the gap between the fingers and extending on proximal part of inner margins; palm longitudinally carinate on proximal part of outer surface . . . . . *H. leachi* Hess

♂ with some few hairs only between bases of fingers, externally; a somewhat larger tuft on palm, quite near articulation with wrist; palm not carinate . . . . *H. subquadrata* (Dana)

1) *Ocypode (Helice) tridens* de Haan, Faun. Japon., Crust., 1835, p. 57, pl. 11, f. 2, pl. 15, f. 6; *Helice t.* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 189; TARGIONI-TOZZETTI, Viaggio "Magenta", Crost., 1877, p. 155, pl. 10, f. 2; MIERS, Proc. Zool. Soc. London, 1879, p. 38; KINGSLEY, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 219; ORTMANN, Zool. Jahrb., Syst., Bd. 7, 1894, p. 727; KOELBEL, Wiss. Erg. Reise Széchenyi 1877—1880, Bd 2, 1898, p. 570; STIMPSON, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 133. Hab. Japan, Hongkong and Loo-Choo Islands.

2) Ann. Sc. Nat. (3) t. 20, 1853, p. 190. Hab. unknown.

3) Ann. Sc. Nat. (3) t. 20, 1853, p. 190. Hab. Sumatra. This species in its strong granulation of carapace and chelae resembles *Chasmagnathus granulatus* Dana (U. S. Expl. Exp., Crust., 1852, p. 364, pl. 23, f. 6), but this is an Atlantic (Brazilian) species.

4) *Cyclograpsus g.* H. Milne-Edwards, Hist. nat. Crust., t. 2, 1837, p. 79; *Paragrapsus g.* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 196; HASWELL, Cat. Austral. Crust., 1882, p. 105, pl. 2, f. 4. Hab. Australia and Tasmania.

5) *Cyclograpsus latreilli* H. Milne-Edwards, Hist. nat. Crust., t. 2, 1837, p. 80; *Helice l.* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 190; MIERS, Rep. "Challenger", Brachyura, 1886, p. 268, pl. 21, f. 2; DE MAN, Zool. Jahrb., Syst., Bd. 9, 1896, p. 343, Bd 10, 1898, pl. 31, f. 41. Hab. Mauritius, Philippines and Fiji Islands, Atjeh.

1. *Helice leachi* Hess.

1865. *Helice leachii* Hess. Arch. Naturgesch., Jahrg. 31, 1., p. 153.
1873. *Helice pilimana* A. Milne-Edwards. Nouv. Arch. Mus. Paris, t. 9, p. 313, pl. 18, f. 1.
1882. *Helice leachi* Haswell. Cat. Austral. Crust., p. 107.
1887. *Helice leachi* de Man. Zool. Jahrb., Syst., Bd 2, p. 702.
1894. *Helice leachi* Ortmann. Denkschr. med.-naturw. Gesellsch. Jena, Bd 8, p. 57.
1907. *Helice leachii* Rathbun. Mem. Mus. comp. Zool. Harvard Coll., v. 35, n° 2, p. 36.

Stat. 33. Bay of Pidjot, Lombok. 1 ♂ juv., in river.
Stat. 200. Bay of Bara, north coast of Buru. 1 ♂ juv.

De Man, who examined the type specimen of Hess, proclaimed the identity of *H. leachi* and *H. pilimana*. The tuft of hairs in the gap of the fingers renders this species very conspicuous, and also the hirsute anterior part of the sternum. On the arm of the cheliped there is (in the ♂ at least) a musical crest, situated quite near the distal fourth part of the inner (anterior) margin, as has been observed by de Man. Corresponding to the presence of this crest, the infra-orbital ridge is transformed into an irregular series of tubercles: beginning from the epistome there is firstly a series of small tubercles, gradually increasing in size laterally; beneath the outer orbital angle a much larger, elongate tubercle is placed, that laterally is strongly declivous, and is immediately followed by a shomewhat smaller tubercle, the sides of which are strongly and regularly sloping; finally there is a third tubercle, smaller than the preceding and placed vertically beneath the anterior incision of the carapace.

This species has been first recorded from Australia (Sydney) and afterwards from New Caledonia, the Carolines and Japan; the finds of the "Siboga" now prove, that *H. leachi* is also an inhabitant of the Moluccas and Lombok. Already Ortmann collected the species at Dar-es-Salaam.

Dimensions in mm. of the larger ♂:

| | |
|---|---|
| Distance between external orbital angles | 9.75 |
| Distance between tips of anterior epibranchial teeth | 10.5 |
| Length of carapace | 8.75 |
| Horizontal length of chela | 9.5 |
| Height of palm | 6.— |
| Breadth of third segment of abdomen | 4.75 |
| Breadth of base of penultimate segment of abdomen | 2.— |
| Length of penultimate segment of abdomen | 2.— |

2. *Helice subquadrata* (Dana). Pl. 6, Fig. 1.

1851. *Chasmagnathus subquadratus* Dana. Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 251.
1852. *Chasmagnathus subquadratus* Dana. U. S. Expl., Exp., Crust., p. 363, pl. 23, f. 5.
1865. *Chasmagnathus subquadratus* Hess. Arch. Naturgesch., Jahrg. 31, 1., p. 152.
1882. *Chasmagnathus subquadratus* Haswell. Cat. Austral. Crust., p. 106.
1894. *Chasmagnathus subquadratus* Ortmann. Zool. Jahrb., Syst., Bd 7, p. 728.

Stat. 19. Bay of Labuan Tring, west coast of Lombok. 1 ♂.

Dana made known three species of "*Chasmagnathus*", but strictly adhering to the limits

assigned to *Helice* and *Chasmagnathus* in the present paper, I prefer to refer two of DANA's species (*subquadratus* and *granulatus*) to *Helice* and his third species (*laevis*) to *Paragrapsus*. Indeed, in the original description of *Helice* and *Chasmagnathus*, as conceived by DE HAAN, the carapace is only little narrowed anteriorly in the former genus, and the postero-lateral margins are subparallel, not distinctly converging backward, and more or less concave; besides, the abdomen of the ♂ is somewhat narrower, the palm of the chela is higher than long, and the merus of the external maxillipeds, though narrowed towards the ischium, is nearly as broad anteriorly as long.

The specimen before me is an apparently not full-grown ♂ and, notwithstanding the brief description of DANA, there are some striking features, that induce me to identify the animal with *H. subquadrata*.

The carapace is little vaulted transversely, somewhat more so in a longitudinal direction, notably anteriorly, so that the front is obliquely deflexed. The maximum breadth is lying between the tips of the posterior epibranchial teeth, and the length is 79—80% of the greatest breadth, as in DE MAN's specimens of *H. latreilli*.

The usual areas of the carapace are rather distinct; the epigastric regions are well defined, bulging, separated one from another by a rather broad medial groove, into which the anterior lobe of the mesogastric regions extends; the cervical furrow is deep at both ends, but interrupted in the middle, so that mesogastric and cardiac region here pass into one another; the latter is smaller and narrower than the former, roughly hexagonal; intestinal region scarcely indicated; hepatic and branchial regions not separated, the latter, as usual, strongly sloping towards the bases of the two last pairs of legs. The whole surface is pitted, the punctae being coarser on the anterior half of the carapace; besides, the epigastric areas and the front present under strong magnification a very minute granulation among the punctae, quite as DE MAN described in *H. latreilli*. On the sloping parts of the branchial regions we observe numerous setiferous granules, that tend to arrange themselves in oblique rows; one of these rows is more continuous than the rest and parts from the middle of the postero-lateral margin of the carapace. Quite behind, above the bases of the last two pair of legs, there is on either side of the carapace a conspicuous folding of the surface, that is somewhat sigmoid, but on the whole parallel with the posterior margin; this folding has been observed by DE MAN in quite the same way (though in the present species it does not reach so far laterally) in *H. latreilli*, and, likewise, the distance of both foldings, that are larger than the oblique granulate lines mentioned above, is about equal to the length of each folding. The posterior margin of the carapace is, as usual, accompanied by a fine line, running parallel and very close to it; above the bases of the posterior pair of legs this line more and more approaches the margin and finally disappears altogether.

In front view the anterior margin of the front turns out to be slightly wavy at either side of the median notch and the lateral angles are more distinct than in the type species of the genus, *H. tridens*: though the angle is rounded and very obtuse (about 135°), it is at least present, whereas in *H. tridens* the anterior margin passes without any transition into the

inner margin of the orbit. For the rest there is no difference in the course of the inner and upper orbital margin between the two species, but the external orbital angle is less acute in *H. subquadrata*, the outer margins of these angles are somewhat diverging backward and as long as the subparallel margins of the anterior epibranchial teeth; the posterior teeth are much smaller, more acuminate and directed obliquely-outward, so that the greatest width of the carapace is found between the tips of these posterior teeth; behind the latter the side margins are parallel, slightly concave. Any trace of additional notches, which in *H. tridens* mark off a third and even a fourth pair of epibranchial teeth on the postero-lateral margins of the carapace, is altogether absent in the present species.

The margins of the front, of the orbits and the antero-lateral borders of the carapace, up to the posterior lateral teeth, are continuously granulate and the whole of the lateral margins is accompanied by a ciliated row immediately beneath the margins. The side walls of the body are vertical and, like the pterygostomian regions, ornamented in the usual way of the *Sesarminae*.

Owing to the inflated under parts of the body the epistome is vertically placed, but not projecting beyond the front in dorsal view. In accordance with the presence of a "musical crest" on the cheliped the infra-orbital border is peculiarly transformed. Beginning from the epistome the whole orbital portion is occupied by a series of about 12 obtuse verrucosities, that are finely transversely striate; the series is interrupted in the middle. Beneath the cornea of the eye and at the end of the orbital portion we observe a large, rounded, elongate tubercle, that laterally and backward tapers into a ridge of about twice the length of the tubercle itself; this ridge at the end again rises into a small tubercle of similar shape as the preceding. The shape of the infra-orbital border is widely different from that of *H. tridens*, but it approaches that of *H. latreilli*: in both species the infra-orbital border reaches backward only to the first notch of the lateral margin of the carapace, and an elongate tubercle is found beneath the cornea of the eye, but laterally and backward this tubercle or thickened ridge is followed in *H. latreilli*, according to DE MAN's description, by 3—4 similar, but smaller tubercles (only one in the present species) and the orbital portion is occupied either by a continuous wavy crest or a series of 3—4 elongate, transversely-striate tubercles, followed by 5 smooth granules towards the epistome.

The part of the sternum between the abdomen and the bases of the external maxillipeds is shortly hirsute. This character has been also figured by DANA in his figure 5*a* and it is indeed one of the chief reasons why I referred my specimen to his "*Chasmagnathus*" *subquadratus*. In *H. leachi* the anterior part of the sternum is also hairy, but here the hairs are much larger. DE MAN in his discription of *H. latreilli* does not particularly state, that the hairs of the maxillipeds extend to the sternum, but if they do, we may safely assume, that it would not have escaped to DE MAN's experienced eye.

In comparing my figure 1*d* with DE MAN's figure 41*c* of *H. latreilli* it at once becomes obvious that the abdomina of the two species are very much alike, but in *H. subquadrata*

the abdomen is generally somewhat broader. The terminal segment is as long as broad at the base (in *H. latreilli* longer), the length of the penultimate segment is two-thirds of its width at the base (four-fifths in *H. latreilli*, so that in this species the segment is longer), the two preceding segments are alike in length and shorter than the sixth segment. As far as can be judged from DANA's figure of the abdomen, it agrees with my drawing.

Contrary to what is found in *H. latreilli* the chelipeds are wholly equal in size; although the meropodite wholly agrees with that of this species, the place of the musical crest is different: it is found quite anteriorly, where the roughly granulate inner or anterior margin curves inward towards the wrist and, though small, it is conspicuous by a deeply-brown colour. Upper surface of wrist very minutely granulate and defined inward by a longitudinal row of somewhat larger granules; at the inner angle a small tooth is found, that is followed backward by a longitudinal row af 6—7 teeth, which successively decrease in size.

The chelae are inflated; the height of the palm is nearly equal to the length of the movable finger; the outer surface is minutely granular, with pits of somewhat larger size; in the ventral half there is, near to the articulation with the wrist, a very short, longitudinal row of granules, that is continued indistinctly towards the fingers by some punctae, but the row is different from the more or less prominent carina on the chela of *H. leachi*. Near the articulation with the wrist a tuft of short hairs is observed, and a row of similar hairs is found at the opposite margin of the wrist; the upper border of the palm is keeled in its proximal third and accompanied by a row of hairs, but rounded distally; the whole margin is roughly granulate and bordered towards the outer surface by a continuous row of very minute granules, that are again defined externally by a row of short hairs; the inner surface is slightly granular, and at the proximal under angle a rounded lobe projects freely and is roughly crenulate at the convex margin. The fingers are short, nearly wholly straight, not flattened, acuminate at the horny tips, not gaping, and provided at the inner margins with 4—5 crenulations in the case of the movable finger, and with a few more on the opposite margin; externally we find a very small patch of short hairs between the bases of the fingers, which hairs also extend to the movable finger; as is well known this patch is much larger in *H. leachi* and even induced A. MILNE-EDWARDS to name this species *H. pilimana*.

The shape of the walking legs presents nothing remarkable, except that the meropodites (that are three times as long as broad) are armed anteriorly with a rectangular prominence, which, like the distal margin of the meropodite, is shortly hirsute; in *H. leachi* and *H. latreilli* the meropodites are unarmed, in *H. tridens* they present a more or less acute spine. The dactyli are as long as the propodites, somewhat curved, compressed, and provided with some rows of hairs. Carpo- and propodite of the first to third pair of ambulatory legs are clothed with a more or less continuous very short fur on the anterior margin and upper and under surface; this clothing is reduced gradually towards the hind pair of legs, which is nearly naked; the hind margins of mero-, carpo- and propodite show some long and scattered hairs. DANA says, that the 5th joint of the first pair of walking legs is tomentose above and on anterior surface, but not below, which does not agree with my finds.

The animal is of a reddish-yellow colour, with irregular, large, reddish blotches on the anterior half of the carapace.

DANA records the species from New South Wales or New Zealand, the exact locality being apparently unknown. ORTMANN mentions two specimens from Tahiti, but unfortunately he gives no description. If my determination be right, the species also occurs at Lombok. From *H. latreilli* it is certainly distinct, though it is closely related to that species.

Dimensions in mm.:

| | |
|---|---|
| Distance between external orbital angles | 12.— |
| Maximum breadth of carapace | 13.5 |
| Length of carapace | 10.75 |
| Posterior margin of carapace | 7.5 |
| Length of cheliped | 21.— |
| Horizontal length of chela | 9.5 |
| Height of palm | 6.— |
| Length of movable finger | 5.5 |
| Breadth of 3d segment of abdomen | 6.7 [1] |
| Length of 6th segment of abdomen | 2.2 [1] |
| Breadth at base of 6th segment of abdomen | 3.3 [1] |
| Length of terminal segment of abdomen | 1.65 [1] |
| Breadth at base of terminal segment of abdomen | 1.8 [1] |

## Chasmagnathus de Haan.

1835. *Chasmagnathus* de Haan. Faun. Japon., Crust., p. 27.

This genus is distinct from *Helice* by the postero-lateral margins of the carapace being convergent and the antero-lateral margins divergent backward, by a generally broader shape of the abdomen of the ♂, by the palm of the chelae being longer than high, and by the merus of the external maxillipeds being nearly half as broad anteriorly as long and much more elongate than in *Helice*.

Thus restricted the genus includes only the well-known Japanese species *Ch. convexus* de Haan [2]). Now HERKLOTS in his Symbolae carcinologicae [3]), that deal with the collection of Crustacea in the Leiden Museum, mentions two new species: *Ch. gibbosus* de Haan M.S. from Java, and one, unnamed, from Abessynia. The latter species I have not found back: *Ch. gibbosus* is represented by three specimens (all ♀, dried), one of which is a new species of *Sarmatium* (*fryatti*), already described in my paper on *Sesarma* etc. [4]) and the remaining specimens undoubtedly belong to *Ch. convexus*. The locality (Java, KUHL et VAN HASSELT coll. seems to me to be probably erroneous, and perhaps the two specimens of *Chasmagnathus* have been mislaid.

1) Measured under microscope.

2) *Ocypode (Chasmagnathus) convexus* de Haan, Faun. Japon., Crust., 1835, p. 56, pl. 7, f. 5; ADAMS et WHITE, Zool. Voy. "Samarang" 1850, p. 52; *Chasmagnathus convexus* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 200; ORTMANN, Zool. Jahrb. Syst., Bd 7, 1894, p. 727; STIMPSON, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 133. Hab. Japan and Loo-Choo Islands. The species described by HASWELL under this name (Cat. Austral. Crust., 1882, p. 106) is, as ORTMANN rightly remarks, certainly different from that of DE HAAN, and it cannot even be traced to which genus it should belong.

3) Tijdschr. Entomol., t. 4, 1861, p. 128.

4) Zool. Med. Mus. Leiden, v. 3, 1917, p. 216, textfig. 6.

## Paragrapsus H. Milne-Edwards.

1853. *Paragrapsus* H. Milne-Edwards. Ann. Sc. Nat. (3) t. 20, p. 195.

This genus has often been considered to be wholly identical with *Chasmagnathus*, but in the type species of *Paragrapsus* (*quadridentatus*) the anterior margin of the front is nearly straight, not rounded in dorsal view, and the lateral angles are distinct and subrectangular, the abdomen of the ♂ is not produced laterally at the 3d segment, and the dactyli of the last pair of legs are not compressed as in *Helice* and *Chasmagnathus*, but conical and short, resembling those of *Cyclograpsus*, to which genus the present one shows much more affinity than to *Chasmagnathus*.

Milne-Edwards described very shortly four species of *Paragrapsus*; of these only one, the type species, is rather well known; of the three remaining species two (*gaimardi* and *urvillei*) are referred by me to *Helice* (see p. 118), though my reasons for doing so are admitted to rest on very unstable ground; the species *P. verreauxi* is identified by Kingsley [1]) with *Chasmagnathus laevis* Dana, and this latter species of which I could examine two specimens, certainly belongs to the present genus, as Heller [2]) already stated, for the shape of the front is distinctly different from that of *Chasmagnathus* and *Helice*, and the abdomen of the ♂ regularly tapers from the base to the tip and is not broadened at the third segment.

It follows, then, that only two species, *quadridentatus* and *laevis*, are admitted.

Key to the species:

Only one notch behind external orbital angle. Epigastric lobes very little prominent . . . . . *P. quadridentatus* H. Milne-Edw. [3])

Two notches behind external orbital angle. Epigastric lobes distinctly prominent . . . . . *P. laevis* (Dana) [4])

## Cyclograpsus H. Milne-Edwards.

1837. *Cyclograpsus* (part.) H. Milne-Edwards. Hist. nat. Crust., t. 2, p. 77.
1838. *Gnathochasmus* Mc Leay. Smith's Ill. Zool. S. Africa, p. 65.

Many species originally referred to *Cyclograpsus* by Milne-Edwards are now classed among other genera, but still it contains at least 9 Indo-Pacific species. It is most closely related to *Paragrapsus*, which it resembles in the shape of the dactyli of the walking legs, but differs by the lateral margins of the carapace being entire or only very obscurely toothed.

1) Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 222, where also the synonymy of this species is recorded. On Pl. 6, fig. 2*a* and 2*b* I have figured the propodite and dactylus of the last pair of legs and the abdomen of the ♂, which figures illustrate the evidence of Dana's species to be referred to *Paragrapsus*.

2) Reise "Novara", Crust., 1865, p. 55.

3) Ann. Sc. Nat. (3) t. 20, 1853, p. 195; *Cyclograpsus q.* Hess, Arch. Naturgesch., Jahrg. 31, 1, 1865, p. 26; *Paragrapsus q.* Haswell, Cat. Austral. Crust., 1882, p. 105, pl. 3, f. 1; de Man, Zool. Jahrb., Syst., Bd 4, 1889, p. 441; *Chasmagnathus q.* Ortmann, Zool. Jahrb., Syst., Bd 7, 1894, p. 728. Hab. Australia (east coast) and Tasmania.

4) *Chasmagnathus laevis* Dana, Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 252; U. S. Expl. Exp. Crust., 1852, p. 365, pl. 23, f. 7; *Paragrapsus verreauxi* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 195; *P. laevis* Heller, Reise "Novara", Crust., 1865, p. 55; *Chasmagnathus l.* Kingsley, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 222; Haswell, Cat. Austral. Crust., 1882, p. 106; Bd. 7, 1894, Miers, Zool. Voy., "Alert", Crust., 1884, p. 246; Ortmann, Zool. Jahrb., Syst., p. 728. Hab. Australia and New Zealand.

Some species described by MILNE-EDWARDS are very badly known; such are: *C. whitei*, *C. granulosus*, *C. reynaudi* and *C. eydouxi*. Most likely they are synonymous to others.

Key to the Indo-Pacific species:

| | |
|---|---|
| 1. Lateral margins of carapace convex . . . . . | 2 |
| Lateral margins of carapace straight, subparallel or even divergent backward . . . . . | 5 |
| 2. Meropodites of walking legs very broad, foliaceous, widening distally and sharply keeled . . . . . | *C. lophopus* Nobili [1]) |
| Meropodites of walking legs slender, not foliaceous . . | 3 |
| 3. Abdomen of ♂ very broad, with the lateral margins parallel, penultimate segment at base nearly three times as broad as terminal segment . . . . . | *C. cinereus* Dana [2]) |
| Abdomen of ♂ with the lateral margins convergent towards the terminal segment . . . . . | 4 |
| 4. Inner surface of palm of chela with a longitudinal row of sharp granules; palm itself higher than long . . | *C. audouini* H. Milne-Edwards [3]) |
| Inner surface of palm mostly smooth, but in large individuals with a longitudinal row of some low granules; palm itself longer than high . . . . . | *C. punctatus* H. Milne-Edwards [4]) |
| 5. Anterior half of carapace rather strongly and closely punctate. Inner margins of fingers of chela not dentate | *C. granulatus* Dana [5]) |
| Carapace smooth or sparsely punctate . . . . . | 6 |
| 6. Lateral margins of carapace divergent backward and with two obscure notches anteriorly. Regions tolerably distinct | *C. longipes* Stimpson [6]) |

1) Bull. Mus. Paris, t. 11, 1905, p. 411; Ann. Sc. Nat. (9) t. 4, 1906, p. 321, pl. 11, f. 4. Hab. Red Sea.

2) Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 251; U. S. Expl. Exp., Crust., 1852, p. 360, pl. 23. f. 3; *Cyclograpsus eydouxi* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 198; *C. cinereus* Rathbun, Bull. U. S. Fish. Comm. for 1903, v. 23, prt 3, 1906, p. 840; Proc. U. S. Nat. Mus., v. 38, 1911, p. 590. Hab. west coast of America and Hawaiian Islands.

3) Hist. nat. Crust., t. 2, 1837, p. 78; Ann. Sc. Nat. (3) t. 20, 1853, p. 197; DANA, U. S. Expl. Exp., Crust., 1852, p. 350, pl. 23, f. 2; *C. lavauxi* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 197; *C. whitei*? H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 197; *C. laevis* Hess, Arch. Naturgesch., Jahrg. 31, 1., 1865, p. 152; *C. lavauxi* Miers, Cat. Crust. New Zealand, 1879, p. 41; *C. lavauxi* Haswell, Cat. Austral. Crust., 1882, p. 103; FILHOL, Miss. île Campbell, t. 3, prt 2, 1885, p. 390, pl. 41, f. 6; *C. laevis* de Man, Zool. Jahrb., Syst., Bd 2, 1887, p. 700; *C. punctatus* (part.) Ortmann, Zool. Jahrb., Syst, Bd 7, 1894, p. 729; *C. audouini* Stimpson, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 132. Hab. east coast of Australia, New Guinea and New Zealand. DE MAN stated the identity of *C. laevis* Hess with *C. lavauxi* H. Milne-Edwards and the latter has been usually considered synonymous with *C. audouini* of the same author, though the original specimen of *C. audouini* came from New Guinea, and that of *C. lavauxi* from New Zealand. DE MAN afterwards (Zool. Jahrb., Syst., Bd 9, 1896, p. 352) had the opportunity of examining original specimens both of *C. audouini* and *C. lavauxi*, but he does not expressly state any difference between them. Some authors (HASWELL) deny, that the *C. audouini* of DANA should be identical with that of MILNE-EDWARDS.

4) Hist. nat. Crust., t. 2, 1837, p. 78; *Gnathochasmus barbatus* Mc Leay, SMITH's Ill. Zool. S. Africa, 1838, p. 65, pl. 3; *Sesarma barbata*? Krauss, Südafr. Crust., 1843, p. 45, pl. 3, f. 3; *Cyclograpsus punctatus* and *C. reynaudi* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 197, pl. 7, f. 9; HASWELL, Cat. Austral. Crust., 1882, p. 104; ORTMANN (part.), Zool. Jahrb., Syst., Bd 7, 1894, p. 729; STIMPSON, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 132; STEBBING, S. A. Crust., prt 5, 1910, p. 318; RATHBUN, Proc. U. S. Nat. Mus., v. 38, 1911, p. 590. Hab. Cape of Good Hope, but also Tasmania, Hongkong, Juan Fernandez and Chile.

5) Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 251; U. S. Expl. Exp., Crust., 1852, p. 361, pl. 23, f. 4; RATHBUN, Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, 1906, p. 840. Hab. Hawaiian Islands.

6) Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 105; DE MAN, Zool. Jahrb., Syst., Bd 9, 1896, p. 355, Bd 10, 1898, pl. 32, f. 15; STIMPSON, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 131; RATHBUN, Mem. Mus. comp. Zool. Harvard Coll., v. 35, nº 2, 1907, p. 30. Hab. Bonin Islands, Atjeh, Tahiti, Paumotus and Fiji Islands.

| | |
|---|---|
| Lateral margins of carapace parallel, except immediately behind external orbital angle. . . . . | 7 |
| 7. Infra-orbital ridge in ♂ regularly crenulate . . . . . | 8. |
| Infra-orbital ridge in ♂ subdivided into three elongate lobules; the lateral one the longest . . . . . | *C. parvulus* de Man |
| 8. Two obscure notches (sometimes only one) behind each external orbital angle . . . . . | *C. intermedius* Ortmann [1] |
| Lateral margins of carapace entire. . . . . | *C. henshawi* Rathbun [2] |

1. *Cyclograpsus parvulus* de Man.

1896. *Cyclograpsus parvulus* de Man. Zool. Jahrb., Syst., Bd 9, p. 350, Bd 10, 1898, pl. 32, f. 42.
1907. *Cyclograpsus parvulus* Rathbun. Mem. Mus. comp. Zool. Harvard Coll., v. 35, n° 2, p. 36.

Stat. 64. Tanah Djampeah, Flores Sea. 1 ♀.

This specimen agrees nearly completely with those of DE MAN, but the inner part of the infra-orbital ridge in my ♀ is not entire, but consists of 5 small lobules, and the lateral portion is likewise subdivided into 3—4 lobules, as DE MAN rightly remarked in the case of the ♀. The original specimens came from Atjeh; afterwards the species has been collected at the Paumotus.

NOBILI has described a subspecies (*unidens*) [3] in which one epibranchial tooth is found behind the external orbital angle and the posterior margin of the penultimate segment of the abdomen of the ♂ is not straight, but concave forward.

I retained the name of *parvulus* for this species, but DE MAN himself observed afterwards [4], that his species should be considered at most a subspecies of the Atlantic *C. occidentalis* A. Milne-Edwards.

## Subfam. PLAGUSIINAE.

There are two well known genera belonging to this group: *Plagusia* and *Percnon* (= *Leiolophus*), which are at once characterized by the stout antennulae being lodged in oblique fossae of the front and visible in dorsal view. The middle segments of the abdomen are largely coalesced in both sexes, the carpus of the external maxillipeds articulates near the antero-external angle of the merus, and the lateral margins of the carapace are toothed.

The two genera are at once distinguished by the following characters:

| | |
|---|---|
| Carapace thick. Merus of external maxillipeds as broad as ischium . . . | *Plagusia* Latreille |
| Carapace much flattened. Merus of external maxillipeds much smaller and narrower than ischium . . . . . | *Percnon* Gistel |

1) Zool. Jahrb., Syst., Bd 7, 1894, p. 728. Hab. Indian Ocean, Loo-Choo Islands and Japan. Perhaps *C. intermedius* is synonymous to *C. longipes*.

2) Proc. U. S. Nat. Mus., v. 26, 1902, p. 75, textfig. 1—2; Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, 1906, p. 840. Hab. Hawaiian Islands.

3) Ann. Mus. Hung., v. 3, 1905, p. 501. Hab. Berlinharbour, German New Guinea.

4) Mém. Soc. Zool. France, 1900, p. 57.

## Plagusia Latreille.

1806. *Plagusia* (part.) Latreille. Gen. Crust. et Insect., t. 1, p. 33 [1]).

Alcock [2]) states, that in *Plagusia* the exognath of the external maxillipeds is destitute of a flagellum, but already de Haan has figured one in *P. dentipes*, and both Stebbing and Borradaile state the occurrence of a flagellum in *P. capensis*.

Alcock also remarks, that the habits of this genus (and of *Percnon*) "to a certain extent resemble (those of) the *Grapsi*, dodging about rocks that are awash at high tide, and hiding in crannies when pursued. They also resemble *Varuna* in being able to make themselves at home on drift timber in the open sea. This will account for the very wide range of some of the species". Indeed, both genera contain an almost cosmopolitical species, occurring everywhere on tropical coasts; in the genus *Plagusia* this widely-spread species is separable into several subspecies, as has been clearly traced out by Laurie [3]).

Key to the species:

1. Meropodites of the ambulatory legs with one subterminal tooth on its upper border. . . . . 2
   Meropodites of the ambulatory legs with a series of teeth on its upper margin. Carapace almost entirely destitute of tubercles 4
2. Carapace smooth, not squamose. Interantennular fossae with inner margins granulate. Chelipeds of ♂ very short, outer surface of palm smooth, not costate, upper border granulate . . . *P. glabra* Dana [4])
   Carapace always with more or less distinct squamiform tubercles. Chelipeds of ♂ longer, outer surface of palm longitudinally costate . . . . . 3
3. Three teeth behind external orbital angle . . . . . *P. depressa* (Fabricius) [5])
   Two teeth behind external orbital angle. Carapace wholly covered with large, squamiform tubercles. Palm of chela at outer surface

1) Kingsley (Proc. Ac Nat. Sc. Philadelphia, 1880, p. 224, footnote) rightly remarked, that in the dismemberment of Latreille's genus the name *Plagusia* should have been given to *Percnon*, for the first species mentioned by Latreille is *Plagusia clavimana*, which is now generally considered to be identical with *Percnon planissimum* (Herbst).

2) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 437.

3) Rep. Pearl Oyster Fish. Ceylon, prt 5, 1906, p. 429—430.

4) Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 252; U. S. Expl. Exp., Crust., 1852, p. 371, pl. 23, f. 10; H. Milne-Edwards. Ann. Sc. Nat. (3) t. 20, 1853, p. 179; Miers, Ann. Mag. Nat. Hist. (5) v. 1, 1878, p. 152; Haswell, Cat. Austral. Crust., 1882, p. 111. Hab. New South Wales.

5) The typical *P. depressa*, with squamiform tubercles on the carapace and the lobes (coxal processes) above the bases of the middle pairs of walking legs dentate, is chiefly Atlantic, and even occurs in the Mediterranean. The subspecies are thus divided by Laurie (l. c.):

Carapace covered with numerous — often more or less squamiform — tubercles, each bordered by a fringe of short stiff hairs:
- Posterior coxal process of 2nd and 3d walking legs entire. . . . . *tuberculata* Lamarck
- Posterior coxal process of 2nd and 3d walking legs dentate . . . . . *depressa* Fabricius

Carapace tubercles more depressed — those on gastric region obsolescent. Posterior coxal process of 2nd and 3d walking legs entire. . . . . *immaculata* Lamarck

Laurie, however, points out that there must be a tendency of merging one into another among the subspecies. The *P. squamosa* of Herbst is, according to Laurie, to be discarded, as there is an essential discrepancy, as regards the shape of the coxal processes, between text and figure.

The literature of this most common species, up to 1900 at least, is gathered by Alcock, Journ. As. Soc. Bengal, v. 69, prt 2, p. 437.

with six longitudinal, impressed lines, fingers short, dactylus much curved . . . . . *P. speciosa* Dana [1])

4. Anterior margin of front granulate, with two short teeth in the middle; carapace smooth. Outer surface of palm of chela with deeply-impressed, longitudinal grooves, interspaces granulate and reticulate. . . . . *P. capensis* de Haan [2])

Anterior margin of front with three teeth at either side and two in the middle of the front; carapace everywhere pubescent; hepatic and especially branchial regions with a few groups of spiniform granules. Outer surface of palm of chela with deeply impressed, longitudinal grooves, in which many short hairs are placed, interspaces strongly tuberculate, not reticulate . . . . *P. dentipes* de Haan [3])

1. *Plagusia depressa tuberculata* Lamarck.

Literature: ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 437.

Stat. 33. Bay of Pidjot, east coast of Lombok. 1 ♂.
Stat. 60. Haingsisi, Samau Island, near Timor. 2 ♂, 1 ♀ juv.
Stat. 193. Sanana, Sula Besi, 1 ♂ juv.

The transition between this subspecies and *immaculata* is very gradual, but generally the carapace presents spiniform tubercles, especially on the branchial regions, and is more flattened in the former.

This widely distributed subspecies occurs throughout the whole Indo-Pacific and even on the coast of Chile.

## Percnon Gistel.

1835. *Acanthopus* de Haan. Faun. Japon., Crust., p. 29 (praeocc.).
1848. *Percnon* Gistel. Naturgesch. d. Tierreichs, p. VIII.
1876. *Leiolophus* Miers. Cat. Crust. New Zealand. p. 46.
1900. *Liolophus* Alcock. Journ. As. Soc. Bengal, v. 69, prt 2, p. 439.

1) Proc. Ac. Nat. Sc. Philadelphia, 1851, p. 252; U. S. Expl. Exp., Crust., 1852, p. 369, pl. 23, f. 9; H. MILNE-EDWARDS, Ann. Sc. Nat. (3) t. 20, 1853, p. 179; MIERS, Ann. Mag. Nat. Hist. (5) v. 1, 1878, p. 151; KINGSLEY, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 223; DE MAN, Notes Leiden Mus., v. 12, 1890, p. 89; ORTMANN, Zool. Jahrb., Syst., Bd 7, 1894, p. 731; BORRADAILE, Proc. Zool. Soc. London, 1900, p. 591; RATHBUN, Mem. Mus. comp. Zool. Harvard Coll., v. 35, n° 2, 1907, p. 36. Hab. Paumotu Islands, Tahiti, Funafuti and Rotuma.

2) *Cancer chabrus*? Linné, Syst. nat., ed. 10, 1758, p. 628; Mus. Lud. Ulrici, 1764, p. 438; Syst. nat., ed. 12, 1766, p. 1044; *Plagusia capensis* de Haan, Faun. Japon., Crust., 1835, p. 58; *P. tomentosa* H. Milne-Edwards, Hist. nat. Crust., t. 2, 1837, p. 92; MC LEAY, Smith's Ill. Zool. S. Africa, 1838, p. 66; KRAUSS, Südafr. Crust., 1843, p. 42, pl. 2, f. 6; *P. chabrus* White, Ann. Mag. Nat. Hist. (1) v. 17, p. 497; List Crust. Brit. Mus., 1847, p. 42; *P. tomentosa* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 178; *P. gaimardi* H. Milne-Edwards, Ann. Sc. Nat. (3) t. 20, 1853, p. 178; *P. chabrus* Miers, Cat. Crust. New Zealand, 1876, p. 45; Ann. Mag. Nat. Hist. (5) v. 1, 1878, p. 152; HASWELL, Cat. Austral. Crust., 1882, p. 111; FILHOL, Miss. ile Campbell, t. 3, prt 2, 1885, p. 393; MIERS, Rep. "Challenger", Brachyura, 1886, p. 273, pl. 22, f. 1*d* (cheliped); *P. capensis* Stebbing, S. A. Crust., prt 3, 1905, p. 47; *P. tomentosa* Stimpson, Smithson. Inst., Miscell. Coll., v. 49, 1907, p. 122; *P. chabrus* Stebbing, S. A. Crust., prt 5, 1910, p. 322; RATHBUN, Proc. U. S. Nat. Mus., v. 38, 1910, p. 591; *P. capensis* Stebbing, Transact. Roy. Soc. Edinburgh, v. 50, prt 2, 1914, p. 267, pl. 26*c* (maxillipeds); *P. chabrus* Borradaile, Brit. Antarct. ("Terra Nova") Exp., Zool., v. 3, n° 2, 1916, p. 101. Hab. Cape of Good Hope, Natal, Australia, Tasmania, New Zealand, Tongatabu, Juan Fernandez and Chile.

3) Faun. Japon., Crust., 1835, p. 58, pl. 8, f. 1; H. MILNE-EDWARDS, Ann. Sc. Nat. (3) t. 20, 1853, p. 178; STIMPSON, Proc. Ac. Nat. Sc. Philadelphia, 1858, p. 103; ORTMANN, Zool. Jahrb. Syst., Bd 7, 1894, p. 731; RATHBUN, Mem. Mus. comp. Zool. Harvard Coll, v. 35, n° 2, 1907, p. 36. Hab. Japan and Easter Island.

The time-honoured designation *Leiolophus* has been substituted by *Percnon* [1]) in recent times.

Key to the species:

1. Large species, with a tuft of hairs at inner surface of palm of chela. . . . . *P. pilimanum* (A. Milne-Edw.) [2])
   Smaller species, with the chelae hairless. . . . . 2
2. Anterior margin of epistome with one large median tooth and two smaller lateral ones; pleural groove, limiting the pterygostomial region dorsally, hairy. Abdomen of ♂ broad, terminal segment triangular. Upper border of chelae entire . . . . . *P. planissimum* (Herbst)
   Anterior margin of epistome only with one large median tooth, the lateral ones wanting; pleural groove hairless or nearly so. Abdomen of ♂ narrow, terminal segment roughly semi-circular. Upper border of chelae sulcate *P. abbreviatum* (Dana)

1. *Percnon planissimum* (Herbst).

Literature: ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 439 [3]).

Stat. 33. Bay of Pidjot, east coast of Lombok. 1 ♂ juv.
Stat. 34. Labuan Pandan, west coast of Lombok. 5 ♂ act. div., 2 ♀ with eggs.
Stat. 47. Bay of Bima, Sumbawa. 1 ♀.
Stat. 58. Savu, between Timor and Sumba. 8 ♂ (1 juv.), 7 ♀ (5 with eggs).
Stat. 125. Siau Island, north-east of Manado. 1 ♀ with eggs.
Stat. 127. Great Sangir Island. 2 ♂ juv.
Stat. 129. Karkaralong Islands, between Mindanao and Celebes. 1 ♂, 1 ♀.
Stat. 131. Karakelang, Talaut Islands. 5 ♀ (one with *Sacculina*).
Stat. 169. Atjatuning, west coast of New Guinea. 2 ♂.

This species has a world-wide distribution throughout the warmer seas, and is with *Grapsus strigosus* (Herbst) the most common species of the Grapsidae.

2. *Percnon abbreviatum* Dana.

1851. *Acanthopus abbreviatus* Dana. Proc. Acad. Nat. Sc. Philadelphia, 1851, p. 252.
1852. *Acanthopus abbreviatus* Dana. U. S. Expl. Exp., Crust., p. 373, pl. 23, fig. 11.
1878. *Leiolophus abbreviatus* Miers. Ann. Mag. Nat. Hist. (5) v. 1, p. 154.
1880. *Leiolophus abbreviatus* Miers. Ann. Mag. Nat. Hist. (5) v. 5, p. 314.
1888. *Leiolophus abbreviatus* de Man. Arch. Naturgesch., Jahrg. 53. 1., p. 372.
1892. *Leiolophus abbreviatus* Thallwitz. Abhandl. Mus. Dresden, Bd 3, n° 3, pag. 36.
1894. *Leiolophus abbreviatus* Ortmann. Denkschr. med.-naturw. Ges. Jena, Bd 8, p. 57.

1) RATHBUN, Proc. U. S. Nat. Mus., v. 22, 1900, p. 281.

2) *Plagusia planissima*? Randall, Journ. Ac. Nat. Sc. Philadelphia, 1839, p. 128 (f. RATHBUN, 1906); *Acanthopus pilimanus* A. Milne-Edwards, Nouv. Arch. Mus. Paris, t. 9, 1873, p. 300, pl. 14, f. 5; *Leiolophus p.* Miers, Ann. Mag. Nat. Hist. (5) v. 1. 1878, p. 154; KINGSLEY, Proc. Ac. Nat. Sc. Philadelphia, 1880, p. 224; ORTMANN, Zool. Jahrb., Syst., Bd 7, 1894, p. 731; *Percnon pilimanus* Rathbun, Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, 1906, p. 842. Hab. New Caledonia, Tahiti, Fiji and Hawaiian Islands.

3) According to DE MAN (Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, 1902, p. 544), who examined the original specimens of "*Acanthopus affinis*" and "*A. tenuifrons*", both described by H. MILNE-EDWARDS (Ann. Sc. Nat. (3) t. 20, 1853, p. 180), these specimens should also enter into the synonymy of the present species.

1896. *Leiolophus abbreviatus* de Man. Zool. Jahrb., Syst., Bd 9, p. 359.
1902. *Liolophus abbreviatus* de Man. Abhandl. Senckenb. Gesellsch., Bd 25, Heft 3, p. 544, pl. 20, f. 13.
1905. *Leiolophus abbreviatus* Lenz. Abhandl. Senckenb. Gesellsch., Bd 27, Heft 4, p. 373.
1906. *Percnon abbreviatum* Rathbun. Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, p. 842.
1911. *Percnon abbreviatum* Rathbun. Transact. Linn. Soc. London (2) v. 14, p. 242.

Stat. 34. Labuan Pandan, west coast of Lombok. 1 ♀.
Stat. 79b. Kabala Dua, Borneo Bank, Macassar Strait. 1 ♂.
Stat. 131. Karakelang, Talaut Islands. 2 ♂, 1 ♀.
Stat. 133. Lirung, Talaut Islands. 1 ♂.
Stat. 220. Binongka Island, south-east of Celebes. 1 ♂.
Stat. 248. Tiur Island, between Kei Islands and Ceram. 1 ♂.

Thanks to DE MAN's researches (especially those of 1902) there is now no difficulty in distinguishing between the common *P. planissimum* and the present species.

The dorsally sulcate chelae, the absence of lateral teeth on the anterior margin of the epistome, the smoothness of the pleural groove and the shape of the last segment of the abdomen of the ♂ are all important features of *P. abbreviatum*, at least as understood by DE MAN, for the author has at different occasions alluded to the probable incorrectness of DANA's figure.

It is also worth of notice, that the chelae of the adult *P. planissimum* are peculiarly high and compressed, whereas they remain small and not dilated in *P. abbreviatum*.

The species is apparently associated with the preceding throughout the whole Indo-Pacific region, but is generally less abundant.

# GECARCINIDAE.

The Gecarcinidae are the true land-crabs, which are mostly characterized by a very thick cephalothorax, with inflated branchial regions, the lateral margins are not defined and keeled only behind the little projecting external orbital angles, the pterygostomial regions are thickly hairy; the orbits are small, the carapace is much vaulted in a longitudinal sense, especially anteriorly, with the regions scarcely or not at all indicated, the penultimate segment of the abdomen of the ♂ is much longer than the preceding, and the dactyli of the walking legs are long, slender and spinous.

The species are scarcely observed to go ever into the water (though the young are probably hatched out in the sea), but spend their lives in hiding during the day among grass, stones, fallen trunks etc., rambling about in the night. PEARSE [1]), who studied with so much success the life of the fiddler crabs (*Uca* = *Gelasimus*), also gave us a pretty account of the habits of *Cardisoma* (*C. guanhumi* Latreille). Like *Uca* it lives on the same mud-flats, and likewise digs burrows, but in digging it makes largely use of its great claws and not of the walking legs. The largely-inflated branchial cavities are lined internally with a thick vascularized membrane, that enables the animal to directly breathing the air, but the same occurs in some species of *Sesarma*, that even climb trees, and in *Geograpsus*. The hairs of the pterygostomial regions retain water a long time, that is continuously oxidized by the air.

The carapace is generally of a bluish, violet or reddish colour, sometimes mottled by yellow patches; the legs are mostly of the latter hue, and the chelipeds are scarlet-red.

The four Indo-Pacific genera, *Cardisoma*, *Gecarcoidea*, *Epigrapsus* and *Grapsodes* are readily to be distinguished by the key of ALCOCK [2]).

### **Epigrapsus** Heller.

1862. *Epigrapsus* Heller. Verh. zool.-bot. Ges. Wien, Bd 12, p. 522.
1865. *Nectograpsus* Heller. Reise "Novara", Crust., p. 56.
1865. *Grapsodes* Heller. Reise "Novara", Crust., p. 58.

*Epigrapsus* and *Nectograpsus* are identical, being based on the same species. As to *Grapsodes*, it has been treated of as an independent genus, but I agree with ALCOCK that it

1) Proc. U. S. Nat. Mus., v. 49, 1915, p. 553—554. See also ORTMANN (Zool. Jahrb., Syst., Bd 10, 1897, p. 338—340), GRAVIER (Bull. Mus. Paris, t. 12, 1906, p. 498) and GARDINER (Transact. Linn. Soc. London (2) v. 12, 1907, p. 47).

2) Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 440—441. The author, following MIERS, writes: *Geocarcinidae* and *Cardisomidae*, which is undoubtedly right from an orthographical point of view, but the genus that gaves the name to the family has been spelled *Gecarcinus* by LEACH, and LATREILLE writes *Cardisoma*.

is really identical with *Epigrapsus*; all the principal characters: the shape of the orbits and the maxillipeds are wholly the same, and even the minutely and transversely-striated infra-orbital crest, that is as long as the breadth of the orbit, agrees in *Epigrapsus* and *Grapsodes* [1]); in both genera the pterygostomial regions are hirsute in the same way and between the bases of the second and third pair of walking legs there is a tuft of hairs, bordering an opening towards the branchial cavity, as in *Ocypoda* and *Geograpsus*.

Key to the species:

Lateral margins of carapace dentate. Walking legs hirsute . . . . . *E. notatus* (Heller)
Lateral margins of carapace entire or nearly so. Walking legs glabrous, only the dactyli hirsute . . . . . *E. politus* Heller

1. *Epigrapsus politus* Heller.

Literature: ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 443.

Stat. 64. Tanah Djampeah, Flores Sea. 1 ♀.

HELLER's figure is not quite exact as regards the outer orbital angle, which is represented acute and rather prominent, and the proportions of the carapace are inexact, for, as MIERS [2]) remarks, the carapace is broader anteriorly and narrower behind. DE MAN [3]) observed, that usually one epibranchial tooth, though very obscure, is found behind each external orbital angle, and that in the ♀ even a second epibranchial tooth may occur, in such a way that the length of the preceding tooth is somewhat longer than that of the external orbital angle. In my specimen the lateral margins present only one single notch. The carapace is flattened in a transverse sense and the regions are not indicated, but near the margins and on the sloping branchial regions there are a number of obliquely-elongated, somewhat hairy tubercles. The inner angle of the wrist is more pronounced in the ♀ than in the ♂; in the latter sex the chelipeds should be markedly unequal, according to ALCOCK, but DE MAN, who examined 20 ♂, says that they are usually equal in size. The walking legs are smooth and glabrous or nearly so; the dactyli are hirsute, especially in the case of the last two pairs, so that the spinules are largely hidden beneath the hairs, these dactyli are long, subquadrate or pentagonal in transverse section, and wholly straight, only the horny tip being faintly curved.

The general shape of this species, the carapace of which is of a uniform reddish-yellow colour, much resembles *Cyclograpsus* and indeed it has been generally referred to the Grapsidae. From *Cyclograpsus* it is at once distinguished by the form of the maxillipeds, that do not present the diagonally-directed hairy line across the merus, and by the lateral margins of the carapace disappearing at a few distance behind the external orbital angles and not being keeled. In the latter feature it agrees with one species of *Geograpsus* (*G. grayi* H. Milne-Edwards), but the oblique branchial striae, so characteristic of the *Grapsinae*, are entirely wanting and the merus of the external maxillipeds is of a more rounded shape. ALCOCK was the first to place *Epigrapsus* in its proper place.

1) MIERS (Proc. Zool. Soc. London, 1877, p. 160) already alluded to the close affinity of both genera.
2) Rep. "Challenger", Brachyura, 1886, p. 266.
3) Zool. Jahrb., Syst., Bd 9, 1895, p. 79.

The species inhabits the Andamans and Nicobars, Atjeh, New Guinea, New Hebrides, Fiji Islands, Ponapé (Samoah) and Tahiti. About its habits nothing is known.

2. *Epigrapsus notatus* (Heller). Pl. VI, Fig. 3.

1865. *Grapsodes notatus* Heller. Reise "Novara", Crust., p. 58, pl. 5, f. 2.
Literature: ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 442.

Stat. 133. Lirung, Talaut Islands. 13 ♂, 4 ♀.

HELLER's figure is taken from a young individual, but my specimens attain a larger size than that denoted by ALCOCK, the breadth of the carapace of an adult ♂ being 34 mm., the length 29 mm. The carapace is broader than long, flattened transversely, and also in the posterior two-thirds of the longitudinal line, but the anterior part is regularly and strongly curved, so that the front is much deflexed and even curved backward. The whole surface is very minutely punctate and the regions are scarcely defined, the furrows being represented by very faint wrinkles; the cervical groove is only distinct in its lateral parts and situated at three-fifths of the total length of the carapace; the cardiac region is small and very ill-defined, the intestinal area presents a lateral depression at either side; the branchial regions are perpendicularly declivous in their outer posterior angle, and usually exhibit here some faint granules, but in the specimen figured these granules are very large, arranged in obscure and oblique lines and very shortly hirsute; similar, but rounded and pearly granules, are found in this specimen along the whole lateral margins and behind the supra-orbital border and in some parts render these lateral margins rugose. The gastro-hepatic grooves are more or less distinct, but usually their course is only indicated by two obliquely-longitudinal pits, from each of which a very faint groove runs forward towards the notch between the external orbital angle and the anterior epibranchial tooth, where again a pit is found; a third pair of depressions is found on the mesogastric area, before the cervical groove.

In dorsal view the anterior margin of the front is very faintly concave and entire, the lateral angles are somewhat prominent and not rectangular, passing into the concave side margins. Though there is on the surface of the front a faint indication of two flattened postfrontal lobes, the front passes mostly imperceptibly into the epigastric area, but in the specimen figured the postfrontal lobes are more distinctly marked and their anterior margin is formed by a transverse crest. The orbits are very small, not even half as broad as the front, and the eye-stalks not even reach the little prominent, subrectangular external orbital angle, the lateral margins of which are much diverging backward. A second and even a third lateral tooth are always present, but they are obtuse, not acuminate anteriorly, turned upward; the second tooth is as long as the preceding, the third is usually shorter, but it may be fused with some short, oblique or longitudinal verrucosities, immediately behind the tooth, at which place the lateral margins of the carapace completely disappear, as in *Cardisoma*; in dorsal view the postero-lateral outlines of the carapace are subparallel, so that the greatest breadth of the latter is found immediately behind the last antero-lateral teeth. The hind margin is $1^1/_2$ times as broad as the front and accompanied by a fine furrow, that is continued on either side and can be traced forward as far as the bases of the second pair of walking legs, where

the groove, separating the subhepatic and pterygostomial regions and continued backward on the subbranchial regions, joints it. The two former of these regions are entirely glabrous, but between the infra-orbital crest and the bases of the chelipeds a very dense toment is found. The peduncle of the antenna touches the front and is partly concealed; there is a wide gap left between the front and the very small triangular infra-orbital tooth, that is directed obliquely-outward. Laterally there is no wall to the orbit, but beneath the latter we observe a well-defined infra-orbital crest, stretching from the basal joint of the antennae laterally and backward beyond the anterior notch of the carapace, so that its total length is twice the breadth of the orbit; on strong magnification this crest proves to be very minutely transversely striated. In *E. politus* the same crest occurs.

The epistome is distinct, hirsute; its length in the median line, where it strongly projects distally is about one-fourth of the width between the bases of the antennae. The lateral margins of the buccal cavern are diverging distally. The external maxillipeds leave a rhombic space between them; the ischium is as long as the merus, but considerably broader, the inner margin of the merus is straight, the outer somewhat convex and the carpus is inserted near the antero-external angle. The exognath is nearly wholly concealed, very hairy and thick, reaching a little way beyond the suture between ischium and merus, and as ALCOCK remarks, destitute of a flagellum.

The abdomen of the ♂ covers all the space between the bases of the posterior legs; it is triangular and all the segments are distinct; the penultimate segment is as long as the terminal one, and the posterior margin of the former is twice as broad as the anterior margin.

The chelipeds are sometimes markedly unequal, but more often they present no difference in size, and they may be called wholly smooth and glabrous; the borders of the meropodite are, however, faintly crenulate, the inner margin of the wrist, immediately before the articulation with the arm, presents some granules, and in the middle of the inner surface of the palm we observe (in the ♂) two indistinct longitudinal rows, each consisting of three or four largely-separated granules. The palm of the ♂ is very high, higher than long, somewhat compressed, but not keeled, below; the fingers are very widely gaping, slightly compressed; the fixed finger is largely excavated in the proximal half of the inner margin, the distal half begins with a crenulate prominence and is crenulate in the same way up to the acute tip; the movable finger is only slightly curved, the proximal third portion of the inner margin is smooth, then follows a quadrangular and crenulate tooth, and the rest of the inner margin is likewise dentate. In the ♀ the chelae are much smaller and lower; the fingers are longer and fitting closely together, with the inner margins regularly toothed, and the rest of the surface furnished with a number of longitudinal striae, that are prominent near the tip, but are dissolved further backward in rows of very small pits. In the cases, where the ♂ presents unequal chelipeds, the smaller one resembles that of the ♀. ALCOCK already observed, that the inner angle of the wrist is obtuse in the ♂, but always distinctly prominent in the ♀.

The middle pairs of walking legs, which are the longest, are about twice the length of the carapace. The meropodites are smooth for their greater part, but the hind margin is crenulate and near the not particularly keeled anterior margin numerous spiniform granules

are scattered about; the breadth of the meropodite is about one-third of its length; a subdistal, rectangular prominence is found at the anterior margin. Carpo- and propodite together are as long as the meropodite, and the dactyli are very long, longer than the preceding joint, quadrangular in transverse section, slightly curved and armed with four rows of spines.

Usually the walking legs are beset with stiff and long bristles, but in the specimen here figured the legs are almost completely hairless. As has been remarked above, this specimen is also remarkable by the numerous granules on the carapace and by the somewhat flattened front. I think these differences, however, to be merely individual and of no particular importance, for I examined a small ♂ in the Leiden Museum, collected at Pulu Weh, in which the carapace is still more extensively studded with granules and the front more distinctly flattened, but the walking legs are hairy in the usual way.

The chelipeds are always of a reddish-yellow colour, like the sternum; the carapace and the legs are of the same violet-bluish tint as occurs in *Cardisoma*, but some specimens have a uniformly-reddish carapace, in others it is of the general ground-colour of the chelipeds, but mottled and marbled by violet blotches. The latter case occurs in the specimen depicted.

This species was first collected at the Nicobars, MIERS recorded it afterwards from Duke-of-York Island (north of Samoa), DE MAN from Morotai (near Halmaheira) and ALCOCK again from the Nicobars. Besides the Morotai specimen there is in the collection of the Leiden Museum a young ♂ from Pulu Weh (north of Sumatra), collected by Mr. BUITENDIJK in January 1911. Its habits are unknown.

Dimensions in mm.:

| | ♂ | ♀ [1] |
|---|---|---|
| Distance between external orbital angles . | 20.25 | 18.— |
| Greatest width of carapace . . . . . | 32.5 | 29.— |
| Length of carapace . . . . . | 28.— | 26.— |
| Width of anterior margin of front . . . | 11.— | 9.75 |

## **Cardisoma** Latreille.

1825. *Cardisoma* Latreille. Encycl. Méth., t. 10, p. 685.
1870. *Cardiosoma* S. J. Smith. Transact. Connecticut Ac., v. 2 p. 142.
1886. *Cardiosoma* Miers. Rep. "Challenger", Brachyura, p. 219.

This well-known genus is distinguished by the following characters: the carapace is (at least in old specimens) very much inflated, with branchial regions strongly bulging and the lateral margins only distinct in their anterior half; the distance between the external orbital angles is more than half the greatest width of the carapace (as in *Epigrapsus*), but the antennulae are separated by a broad septum, the peduncle of the antenna does not touch the front, the epistome is very short, almost linear, the orbit is defined ventrally and laterally by a finely-crenulated edge and there is no infra-orbital crest beneath it, the cornea of the eye is very large, occupying nearly the whole ventral part of the eye-stalks (as in *Ocypoda*), the merus of the external maxillipeds is as long as the ischium, much narrowed at its base, and the exognath bears a distinct flagellum.

1) This is the specimen here figured.

The genus *Discoplax* A. Milne-Edwards [1]) is very nearly allied to (if not identical with) *Cardisoma*, but as DE MAN [2]) recently pointed out, it is wrong to follow ORTMANN and ALCOCK in simply uniting the only species *D. longipes* with *C. hirtipes* Dana, for there are numerous points of difference.

For the present leaving aside this *D. longipes*, we admit but two species in the Indo-Pacific region, where they represent the typical Atlantic genus *Gecarcinus*.

Key to the species:

Epibranchial tooth immediately behind external orbital angle; lateral margins of carapace strongly and abruptly bulging behind epibranchial teeth; postfrontal lobes indistinct; regions scarcely indicated, hairy part of pterygostomial regions as broad as base of buccal cavern; infra-orbital border passing rectangularly into the lateral one. Meropodites of walking legs with some few hairs only at hind margin . *C. carnifex* (Herbst)

Epibranchial tooth at a longer distance behind external orbital angle; lateral margins of carapace less bulging behind epibranchial teeth; postfrontal lobes and regions of carapace much more distinct; hairy part of pterygostomial regions much broader than base of buccal cavern; infra-orbital border passing with an acute angle into the lateral one. Meropodites of walking legs bordered with bristles at hind margin . *C. hirtipes* Dana [3])

1. *Cardisoma carnifex* (Herbst).

Literature: ALCOCK. Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 445—446.

Stat. 213. Saleyer Island, south of Celebes, 1 ♂ (ad), 2 ♀, with eggs.
Stat. 279. Roma Island, north-east of Timor, 2 ♀.

This well-known species, like the preceding, occurs in the whole Indo-Pacific region.

## Gecarcoidea H. Milne-Edwards.

1837. *Gecarcoidea* H. Milne-Edwards. Hist. nat. Crust., t. 2, p. 25.
Literature: ORTMANN, Zool. Jahrb., Syst., Bd 7, 1894, p. 738.

The rather insufficient diagnosis of H. MILNE-EDWARDS, who in 1853 changed the name of the genus into *Pelocarcinus*, induced WOOD-MASON and afterwards DE MAN to suppose, that their

1) Nouv. Arch. Mus. Paris, t. 9, 1873, p. 294, pl. 15. Hab. New Caledonia.

2) Abh. Senckenb. Ges., Bd 25, Heft 3, 1902, p. 548—549.

3) Literature: ALCOCK, Journ. As. Soc. Bengal, v. 69, prt 2, 1900, p. 447. From the synonymy here given *Discoplax longipes* should be omitted, as has been mentioned, but two other names should be added: firstly *C. frontalis* H. Milne-Edwards from the Loyalty Islands near New Caledonia (Ann. Sc. Nat. (3) t. 20, 1853, p. 204, see DE MAN, Abh. Senckenb. Ges., Bd 25, Heft 3, 1902, p. 548. pl. 20, f. 14), which most likely is at most a subspecies of *C. hirtipes*, and secondly *C. obesum* de Man (nec Dana) (Notes Leiden Mus., v. 2, 1880, p. 35), which certainly belongs to this species.

Miss RATHBUN (Bull. U. S. Fish Comm. for 1903, v. 23, prt 3, 1906, p. 838) has recently replaced the name *hirtipes* by *rotundum*, identifying DANA's species with "*Thelphusa*" *rotunda* Quoy et Gaimard (FREYCINET's voy. around the world, t. 3, Zool., 1825, p. 527, pl. 77, f. 1), but, as CALMAN (Proc. Zool. Soc. London, 1909, p. 711) rightly remarks, description and figure of those earlier French authors are equally poor and wholly insufficient to allow of an exact determination.

specimens were really distinct, and again two genera *Hylaeocarcinus* and *Limnocarcinus*, were established. The inner suborbital lobe in some specimens unites with the front, in others, however, a wide space is left, and this variability caused the authors above named to regard their specimens as belonging to a genus different from *Gecarcoidea*. The inner suborbital lobe is separated by a more or less wide fissure from the infra-orbital border.

The genus is most closely related to *Gecarcinus*, with which it agrees in all principal points: in the width of the front and of the orbits together being not quite half the greatest width of the carapace, in the curvature of the lateral margins of the latter, in the course of the grooves on the carapace and in the shape of chelipeds and walking legs. The external maxillipeds, too, are largely equal, but the merus is much shorter and narrower than the ischium, and the very short flagellum is with its carpus partly concealed behind the merus.

ORTMANN already pointed out, that there is only one single species, to which four generic and five specific names have been applied.

1. *Gecarcoidea lalandei* H. Milne-Edwards.

Literature: ORTMANN, Zool. Jahrb., Syst., Bd 7, 1894, p. 738; CALMAN, Proc. Zool. Soc. London, 1909, p. 710.

Stat. 133. Lirung, Talaut Islands. 6 ♂.

The specimens before me fully illustrate the variability presented by this species in the contact of the inner suborbital lobe with the front and in the width of the suborbital fissure. According to WOOD-MASON (*Hylaeocarcinus humei*) [1]) the mesogastric lobe is studded with granules, but probably this character disappears with advancing age; at least they are absent in my adult specimens and DE MAN [2]) states the same in his *Limnocarcinus intermedius*. From either side of the hairy epistome a crenulated and concave crest runs laterally beneath the orbit; near the epistome it is rather high, but this height soon decreases laterally; its total length is about three times the transverse diameter of the orbit.

With reference to our still limited knowledge of the Gecarcinidae it is worth to note, that ANDREWS [3]) observed at Christmas Island the migration of numbers of the present species towards the sea, to propagate. This occurred during the rainy season, and in 1908, shortly after the migration, he obtained enormous quantities of Megalopa-larvae and of small crabs near the shore, which, according to CALMAN, are most likely the young of this species.

Besides at the locality named the species has been observed at the Nicobars, Andamans Gorontalo (Celebes), Philippines, Loyalty Island, New Guinea and New Britannia. In the Leiden Museum there is still a small specimen from Pulu Weh, collected by Dr. BUITENDIJK.

The original locality (Brazil) of H. MILNE-EDWARDS is scarcely trustworthy.

1) Journ. As. Soc. Bengal, v. 42, prt 2, 1873, p. 260, pl. 14—15.
2) Notes Leiden Museum, v. 2, 1880, p. 65.
3) Monograph of Christmas Island, 1900, p. 163. The author records this species erroneously under the name *Gecarcinus lagostoma*.

# LIST OF THE STATIONS,

## WHENCE SPECIES OF THE FAMILIES HYMENOSOMIDAE, RETROPLUMIDAE, OCYPODIDAE, GRAPSIDAE AND GECARCINIDAE WERE OBTAINED.

---

STATION 4. Djangkar, East Java. *Varuna litterata* (Fabricius), *Sesarma (Sesarma) palawanensis* Rathbun.

STATION 16. Kangeang Island, east of Madura. *Metopograpsus oceanicus* (Jacquinot et Lucas).

STATION 19. Bay of Labuan Tring, west coast of Lombok. *Uca dussumieri* (H. Milne-Edwards), *Uca lactea* (de Haan), *Grapsus strigosus longitarsis* Dana, *Varuna litterata* (Fabricius), *Metasesarma rousseauxi* H. Milne-Edwards, *Sesarma (Parasesarma) calypso* de Man, *Helice subquadrata* (Dana).

STATION 33. Bay of Pidjot, east coast of Lombok. *Tympanomerus ceratophorus* (Koelbel), *Varuna litterata* (Fabricius), *Ptychognathus riedelii pilosa* de Man, *Ptychognathus pusillus* Heller, *Sesarma (Parasesarma) calypso* de Man, *Helice leachi* Hess, *Percnon planissimum* (Herbst), *Plagusia depressa tuberculata* Lamarck.

STATION 34. Bay of Labuan Pandan, east coast of Lombok. *Grapsus strigosus* (Herbst), *Pachygrapsus plicatus* H. Milne-Edwards, *Pachygrapsus planifrons* de Man, *Percnon planissimum* (Herbst), *Percnon abbreviatum* (Dana).

STATION 40. Paternoster Islands, north of Sumbawa. *Ocypoda cordimana* Desmarest, *Ocypoda ceratophthalma* (Pallas).

STATION 47. Bay of Bima, north coast of Sumbawa. *Uca tetragonon* (Herbst), *Uca lactea* (de Haan), *Macrophthalmus graeffei* A. Milne-Edwards, *Macrophthalmus latreillei* Desmarest, *Metopograpsus messor gracilipes* de Man, *Metopograpsus maculatus* H. Milne-Edwards, *Metopograpsus latifrons* (White), *Metopograpsus oceanicus* (Jacquinot et Lucas), *Percnon planissimum* (Herbst).

STATION 50. Bay of Badjo, west coast of Flores. *Ocypoda cordimana* Desmarest, *Ocypoda ceratophthalma* (Pallas), *Uca dussumieri* (H. Milne-Edwards), *Uca lactea* (de Haan), *Uca gaimardi* (H. Milne-Edwards), *Metopograpsus thukuhar* (Owen), *Varuna litterata* (Fabricius).

STATION 51. Madura Bay, west coast of Flores. *Ocypoda kuhli* de Haan, *Grapsus strigosus* (Herbst).

STATION 53. Nangamessi Bay, north coast of Sumba. *Sesarma (Sesarma) impressa* H. Milne-Edwards.

STATION 58. Savu Island, between Sumba and Timor. *Varuna litterata* (Fabricius), *Percnon planissimum* (Herbst).

STATION 60. Haingsisi, Samau Island, near south-west Timor. *Grapsus strigosus* (Herbst), *Plagusia depressa tuberculata* Lamarck.

STATION 61 and 61a. Islands Solor and Adonare, between Flores and Lomblen. *Ocypoda ceratophthalma* (Pallas), *Ocypoda kuhli* de Haan, *Grapsus strigosus* (Herbst), *Metasesama rousseauxi* H. Milne-Edwards.

STATION 64. Tanah Djampeah, Flores Sea. *Macrophthalmus graeffei* A. Milne-Edwards, *Geograpsus lividus stormi* de Man, *Pseudograpsus albus* Stimpson, *Pseudograpsus laniger* n. sp., *Sesarma (Holometopus) villosa* A. Milne-Edwards, *Sesarma (Chiromantes) lenzii* de Man, *Cyclograpsus parvulus* de Man, *Epigrapsus politus* Heller.

STATION 66. Saleyer Island, south of Celebes. *Paracleistostoma dentatum* n. sp.

STATION 71. Macassar. *Ocypoda ceratophthalma* (Pallas), *Macrophthalmus definitus* Adams et White, *Metopograpsus messor gracilipes* de Man.

STATION 79b. Pulu Kabala Dua, Borneo Bank. *Percnon planissimum* (Herbst).

STATION 86. Donggala, west coast of Celebes. *Uca marionis* (Desmarest), *Uca lactea* (de Haan), *Macrophthalmus convexus* Stimpson, *Euplax boscii* H. Milne-Edwards, *Metopograpsus latifrons* (White), *Metopograpsus oceanicus* (Jacquinot et Lucas), *Sesarma (Chiromantes) livida* A. Milne-Edwards.

STATION 89. Pulu Kaniungan, east coast of Borneo. *Ocypoda ceratophthalma* (Pallas).

STATION 93. Pulu Sanguisiapo, Sulu Archipelago. *Ocypoda ceratophthalma* (Pallas).

STATION 115. Kwandang Bay, north coast of Celebes. *Uca marionis* (Desmarest), *Metopograpsus oceanicus* (Jacquinot et Lucas), *Ptychognathus affinis* de Man.

STATION 125. Siau Island, between Celebes and Sangir Islands. *Percnon planissimum* (Herbst).

STATION 127. Taruna Bay, Great Sangir Island. *Elamenopsis lineata* A. Milne-Edwards, *Pseudograpsus laniger* n. sp., *Percnon planissimum* (Herbst).

STATION 129. Karkaralong Islands. *Pachygrapsus minutus* A. Milne-Edwards, *Percnon planissimum* (Herbst).

STATION 131. Karakelang, Talaut Islands. *Ocypoda ceratophthalma* (Pallas), *Uca marionis* (Desmarest), *Uca tetragonon* (Herbst), *Mictyris longicarpus* Latreille, *Dotilla wichmanni* de Man, *Euplax boscii* H. Milne-Edwards, *Ptychognathus riedelii pilosa* de Man, *Ptychognathus guijulugani* Rathbun, *Utica nausithoe* de Man, *Pseudograpsus crassus* A. Milne-Edwards, *Sesarma (Sesarma) lafondi* Jacquinot et Lucas, *Sesarma (Sesarma) modesta* de Man, *Sesarma (Sesarma) impressa* H. Milne-Edwards, *Sesarma (Parasesarma) calypso kükenthali* de Man, *Sesarma (Chiromantes) bidens* (de Haan), *Sarmatium punctatum* A. Milne-Edwards, *Clistocoeloma tectum* (Rathbun), *Percnon planissimum* (Herbst), *Percnon abbreviatum* (Dana).

STATION 133. Lirung, Talaut Islands. *Ocypoda ceratophthalma* (Pallas), *Euplax boscii* H. Milne-Edwards, *Metasesarma aubryi* A. Milne-Edwards, *Sesarma (Sesarma) rotundata* Hess, *Percnon abbreviatum* (Dana), *Epigrapsus notatus* (Heller), *Gecarcoidea lalandei* H. Milne-Edwards.

STATION 142. Obi Major, south of Halmaheira. *Metopograpsus thukuhar* (Owen).

STATION 163. Seget, north-west New Guinea. *Metopograpsus oceanicus* (Jacquinot et Lucas).

STATION 169. Atjatuning, west coast of New Guinea. *Sesarma (Holometopus) elongata* A. Milne-Edwards, *Percnon planissimum* (Herbst).

STATION 172. Gisser Island, near south-east point of Ceram. *Elamena truncata* (Stimpson), *Pseudograpsus albus* Stimpson.

STATION 174. Waru Bay, north coast of Ceram. *Sesarma (Holometopus) elongata* A. Milne-Edwards.

STATION 179. Kawa Bay, west coast of Ceram. *Ocypoda cordimana* Desmarest, *Ocypoda ceratophthalma* (Pallas), *Ptychognathus affinis* de Man, *Sesarma (Sesarma) amphinome* de Man.

STATION 180. Pulu Kelang, between Ceram and Buru. *Metasesarma aubryi* A. Milne-Edwards, *Sesarma (Sesarma) atrorubens* Hess, *Sesarma (Sesarma) gracilipes* H. Milne-Edwards.

STATION 181. Ambon. *Elamena truncata* (Stimpson), *Metopograpsus thukuhar* (Owen).

STATION 193. Sanana Bay, east coast of Sula Besi. *Plagusia depressa tuberculata* Lamarck.

STATION 200. Bara Bay, north coast of Buru. *Metopograpsus latifrons* (White), *Helice leachi* Hess.

STATION 213. Saleyer, south of Celebes. *Cardisoma carnifex* (Herbst).

STATION 220. Binongka Island, south-east of Celebes. *Percnon abbreviatum* (Dana).

STATION 225c. Lucipara Islands, Banda Sea. *Euplax boscii* H. Milne Edwards.

STATION 231. Ambon. *Mictyris longicarpus* Latreille, *Euplax boscii* H. Milne-Edwards, *Grapsus strigosus* (Herbst).

STATION 234. Nusa-Laut Island, east of Ambon. *Varuna litterata* (Fabricius).

STATION 248. Tiur Island, between Ceram and Kei Islands. *Percnon abbreviatum* (Dana).

STATION 250. Kur Island, near Kei Islands. *Uca tetragonon* (Herbst), *Euplax boscii* H. Milne-Edwards, *Tympanomerus integer* n. sp.

STATION 254. West of Kei Islands, depth 310 metres, bottom: fine, grey mud. *Retropluma plumosa* n. sp.

STATION 258. Kei Islands. *Macrophthalmus telescopicus* (Owen).

STATION 263. Great Kei Island. *Ocypoda ceratophthalma* (Pallas).

STATION 277. Dammer Island, south part of Banda Sea. *Grapsus strigosus longitarsis* Dana.

STATION 279. Roma Island, south part of Banda Sea. *Cardisoma carnifex* (Herbst).

STATION 323. Bawean Island, Java Sea. *Mictyris longicarpus* Latreille, *Metopograpsus thukuhar* (Owen).

# APPENDIX.

It is only during press of this paper, that I became acquainted with KEMP's paper on the Brachyura of the Chilka Lake (Rec. Ind. Mus. Calcutta, v. 5, 1913, p. 199—325) in which the interesting species *Camptandrium sexdentatum* Stimpson is again described and figured. On the whole there is a very good agreement between KEMP's statements and mine (p. 65—68); we may only remark, that in young specimens the external orbital angle and the second epibranchial tooth are more acuminate than in the adult, that, judging from KEMP's figure, the ischium of the external maxillipeds present straight, not concave, lateral margins, that the adult female has the meropodites of the walking legs quite unarmed distally, and that in the sex named the dactyli of the ambulatory legs are about equal in length to, not distinctly shorter than, the propodites.

KEMP maintains *Camptandrium* among the *Varuninae*, but still I adhere to my opinion, that all the evidence gathered points to the near affinity of the genus to the Ocypodidae (subfam. *Macrophthalminae*).

KEMP's specimens were obtained in the Chilka Lake (Lower Bengal) at a time, when the water was absolutely fresh. At the same time, however, minute specimens of the present species are recorded from the Ennur backwater, near Madras, "in water of specific gravity 1.0025" (exact salinity not stated). It follows, from the much varying hydrographical conditions of the Chilka Lake, that the species is able to withstand a rather wide range of salinity.

# INDEX.

Note. — Synonyms are printed in Italics. The more important pages are indicated by heavier type.


abbreviatum (Percnon) **130**, 131.
*abbreviatus (Acanthopus)* 130.
*abbreviatus (Leiolophus)* 131.
*abbreviatus (Liolophus)* 131.
*Acanthoplax* 34.
*Acanthopus* 129, 130.
Acmaeopleura 83, **106**.
*acuta (Uca)* 38.
*acutus (Gelasimus)* 38.
*aethiopicus (Grapsus (Pachygrapsus))* 79.
*affinis (Acanthopus)* 130.
affinis (Brachynotus) 105.
*affinis (Dotilla)* 44.
*affinis (Hemigrapsus)* 105.
*affinis (Heterograpsus)* 105.
affinis (Ptychognathus) 87, **91**.
albus (Pseudograpsus) 98, **99**, 100, 101.
*altimana (Varuna)* 86, 88.
altimanus (Ptychognathus) 86, **88**, 90.
amphinome (Sesarma (Sesarma)) 112.
*andamanica (Ptychognathus)* 92.
*andamanicus (Ptychognathus)* 92.
angulatus (Cyrtograpsus) 68.
annulipes (Uca — orientalis) 37.
arabica (Ocypoda rotundata —) 35.
*Archaeoplax* 29.
atrorubens (Sesarma (Sesarma)) 113.
aubryi (Metasesarma) 109.
audouini (Cyclograpsus) 126.
*australe (Hymenosoma)* 13.
australis (Hymenicus) 12, **13**.

*barbata (Ptychognathus)* 87.
*barbata (Sesarma)* 126.
*barbatus (Cancer)* 97.
*barbatus (Gnathochasmus)* 126.
*barbatus (Gnathograpsus)* 87.
barbatus (Ptychognathus) **87**, 93, 94.
*barbigerus (Heterograpsus)* 105.
barbimana (Utica) 95, 96.
*barbimanus (Heterograpsus)* 105.
Baruna 84.
bidens (Sesarma (Chiromantes)) 115.
blanfordi (Dotilla) 43, 45.
borneensis (Utica) 95, 96.
*boscii (Cleistostoma)* 60.
boscii (Euplax) 59.
*boscii (Euplax (Chaenostoma))* 60.
*boscii (Macrophthalmus)* 60.
Brachynotus 84, 97, **102**, 103, 106.
*brevidactylus (Mictyris)* 42.
brevitarsis (Dotilla) 43, 44.

calypso (Sesarma (Parasesarma)) 113.
calypso (Sesarma (Parasesarma) — kükenthali) 113.
Camptandrium 58, **65**, 68.
*Cancer* 83.
capensis (Plagusia) 128, 129.
*Cardiosoma* 132, 136.
Cardisoma 132, 134, **136**, 137.
carens (Macrophthalmus dilatatus —) 58.
carnifex (Cardisoma) 137.
*ceratophora (Dioxippe)* 50.
ceratophorus (Tympanomerus) 49, **50**, 55.
ceratophthalma (Ocypoda) **36**, 51.
*chabrus (Cancer)* 129.
*chabrus (Plagusia)* 129.
*Chaenostoma* 59, 60.
Chasmagnathus 108, 116, 117, 118, 121, **124**, 125.
chlorophthalma (Uca) 40.
chuni (Retropluma) 30, 31, 32, 33.
cinereus (Cyclograpsus) 126.
*clavimana (Plagusia)* 128.
Cleistostoma 48, 58, **61**, 64, 69, 115.
clepsydrodactylus (Dotilla) 43, 44.
Clistocoeloma 108, 109, 115.
*Clistostoma* 61.
coarctata (Uca) 38.

*Coelochirus* 85.
convexa (Ocypoda) 35.
*convexa (Ocypode (Chasmagnathus))* 125.
*convexiusculus (Gaetice)* 84.
convexus (Chasmagnathus) 125.
convexus (Macrophthalmus) 58, **59**.
cooki (Hymenicus) 12, 13, **16**.
coralicola (Rhynchoplax) 17, **19**.
cordimana (Ocypoda) 35, 36.
crabricauda (Scopimera) 46.
crassa (Helice) 118.
*crassimana (Euplax)* 60.
crassimana (Utica) 96.
*crassimanus (Chaenostoma)* 60.
*crassimanus (Hemigrapsus)* 105.
*crassipes (Metaplax)* 117.
crassipes (Pachygrapsus) 76.
crassus (Pseudograpsus) **98**, 100.
crenulata (Metaplax) 116.
crenulatus (Brachynotus) 105.
*crenulatus (Cyclograpsus)* 105.
*crenulatus (Grapsus)* 105.
*crenulatus (Hemigrapsus)* 105.
*crenulatus (Heterograpsus)* 105.
*crenulatus (Metaplax)* 116.
*crenulatus (Rhaconotus)* 116.
*crinipes (Coelochirus)* 88.
crinipes (Geograpsus) 74.
cristatum (Paracleistostoma) 63.
cultrimana (Uca marionis —) 38, 39.
Cyclograpsus 102, 106, 108, 125, **133**.
Cyrtograpsus 68, 103.

definitus (Macrophthalmus) 59.
*deflexifrons (Mictyris)* 42.
demani (Uca) 37.
*dentata (Ptenoplax)* 33.
dentata (Retropluma) 30, 31, 32, 33.
dentatum (Paracleistostoma) 63.
dentatus (Ptychognathus) 86, 90.
*dentipes (Helice)* 117.
dentipes (Metaplax) 117.
dentipes (Plagusia) 128, 129.
depressa (Plagusia) 128.
depressa (Plagusia — immaculata) 128, 129.
depressa (Plagusia — tuberculata) 128, 129.
depressum (Hymenosoma) 6, **8**, 24,
depressum (Paracleistostoma) 63, 68.
depressus (Gaetice) 84.
*depressus (Halicarcinus)* 24.
deschampsi (Tympanomerus) 49.
*dilatata (Ocypode (Cleistostoma))* 62.
dilatatum (Cleistostoma) 61, **62**, 63.
*dilatatus (Grapsus)* 81.
dilatatus (Macrophthalmus — carens) 58.
*Dioxippe* 48.
Discoplax 137.
distincta (Metaplax) 117.
*distinctus (Metaplax)* 117.
Dotilla 41, **43**, 45. 47.
*Dotillidae* 40.
dotilliforme (Cleistostoma) **61**, 62.
*Doto* 43.
dussumieri (Uca) 38, 39.

*easterana (Ptychognathus)* 86.
easteranus (Ptychognathus) 88.
edwardsi (Brachynotus) 103, 105.
edwardsi (Cleistostoma) 61.
edwardsi (Hymenicus) 12, **13**, 15.
Elamena 4, 13, **19**, 23, 24, 25.
*Elamene* 13, 19.
Elamenopsis 5, **26**.
elegans (Metaplax) 116, 117.
elongata (Sesarma (Holometopus)) **109**, 111, 112.
elongatus (Brachynotus) 97.
*elongatus (Hemigrapsus)* 97, 101.
*elongatus (Heterograpsus)* 101, 103.
Epigrapsus **132**, 133, 134, 136.
Eriocheir 84, **106**.
*Eriochirus* 106.
eriophorum (Paracleistostoma) 62.
*erythraeus (Heterograpsus)* 97, 98.
erythraeus (Pseudograpsus) 97, 98, 99, 101, 102.
Euplax 43, 57, **59**, 61.
excelsus (Perigrapsus) 84.
excisa (Uca marionis —) 38, 39.
*eydouxi (Cyclograpsus)* 126.
eydouxi (Metopograpsus) 79.

fakaravensis (Pachygrapsus) 76.
fenestrata (Dotilla) 43.
filholi (Elamena) 20, **24**.
*filholi (Elamene)* 24.
forcipata (Uca) 37.
*frontalis (Cardisoma)* 137.
frontalis (Metopograpsus messor —) 79.
fryatti (Sarmatium) 125.

Gaetice 84.
*gaimardi (Cyclograpsus)* 119.
*gaimardi (Gelasimus)* 39.
gaimardi (Helice) 119.
*gaimardi (Paragrapsus)* 118, 119, 125.
*gaimardi (Plagusia)* 129.
gaimardi (Uca) 37, 39, **40**.
gaudichaudi (Helice) 118, 119.
gaudichaudii (Hymenosoma) 28.
Gecarcinidae 132.
Gecarcinus 132, 137, 138.

Gecarcoidea 132, 137, **138**.
*Gelasimus* 37, 132.
*Geocarcinidae* 132.
Geograpsus 70, **74**, 132, 133.
gibba (Helice) 118.
*gibbosus (Chasmagnathus)* 124.
glaber (Ptychognathus) 87.
glabra (Plagusia) 128.
glabra (Utica) 96.
*globosa (Ocypode (Scopimera))* 46.
globosa (Scopimera) **46**, 47, 48, 51, 52, 53, 55.
*Gnathochasmus* 125.
*Gnathograpsus* 85.
gracilipes (Grapsus maculatus —) 72.
gracilipes (Metopograpsus messor —) 79.
gracilipes (Sesarma (Sesarma)) 112.
gracilipes (Utica) 96.
gracilis (Elamena) 20, **24**.
graeffei (Macrophthalmus) 58.
grandidieri (Macrophthalmus) 58.
granulatus (Chasmagnathus) 121.
granulatus (Cyclograpsus) 126.
*granulosus (Cyclograpsus)* 126.
Grapsidae 70.
Grapsinae **70**, 82, 133.
*Grapsodes* 132, 133.
Grapsus 70, 77, 83, 102, 128.
*grapsus (Cancer)* 71.
*grapsus (Grapsus)* 71, 72.
*grapsus (Grapsus — tenuicrustatus)* 72.
grayi (Geograpsus) **74**, 133.
guanhumi (Cardisoma) 132.
guijulugani (Ptychognathus) 86, **93**.

haasti (Hymenicus) 12, 13.
Halicarcinus 4, 5, **9**, 15.
harpax (Brachynotus) 103, 104.
Helice 108, 116, **117**, 118, 121, 124, 125.
Heloecius 34, 35.
*Hemigrapsus* 102, 103.
Hemiplax 57.
henshawi (Cyclograpsus) 127.
*Heterograpsus* 97, 99, 102, 103.
*hirsutimanus (Metaplax)* 60.
hirtipes (Cardisoma) 137.
hirtipes (Cleistostoma) 61.
hirtipes (Hemiplax) 57.
*Hylaeocarcinus* 138.
*Hymenicinae* 5.
Hymenicus 5, 9, **11**, 12, 13, 17, 19.
Hymenosoma 3, 4, **5**, 12, 13.
Hymenosomidae 3.
*humei (Hylaeocarcinus)* 138.
*huttoni (Halicarcinus)* 9.

Ilyoplax 40.
immaculata (Plagusia depressa —) 128, 130.
impressa (Sesarma (Sesarma)) 113.
*inachoides (Hymenicus)* 19.
inachoides (Rhynchoplax) 17, **19**.
indica (Metaplax) 116.
indica (Tylodiplax) 69.
*indicus (Metaplax)* 116.
inflata (Scopimera) 46.
*inornatus (Grapsus)* 106.
integer (Tympanomerus) 49, **54**.
intermedia (Dotilla) 43, **45**.
intermedia (Metaplax) 117.
intermedius (Cyclograpsus) 127.
intermedius (Grapsus) **71**, 73.
*intermedius (Limnocarcinus)* 138.
*intermedius (Metaplax)* 117.
intermedius (Ptychognathus) 88.
inversa (Uca — sindensis) 37.
investigatoris (Scopimera) 46.

japonicus (Eriocheir) 107.
*japonicus (Eriochirus)* 107.
johannae (Ptychognathus) 86, 88.
jousseaumei (Ocypoda) 35.

kirki (Elamena) 20, **24**.
*kraussi (Goniograpsus)* 77.
*kreffti (Hymenicus)* 17.
*kreffti (Hymenosoma)* 17.
kreffti (Rhynchoplax) 17.
kuhli (Ocypoda) 36.
kükenthali (Sesarma (Parasesarma) calypso —) 113.

lactea (Uca) 39.
*lacustre (Hymenosoma)* 12.
*lacustris (Elamena)* 12, 19.
lacustris (Hymenicus) 12.
*lacustris (Hymenosoma)* 12.
laeve (Hymenosoma) 28.
*laevis (Cyclograpsus)* 126.
*laevis (Chasmagnathus)* 121, 125, 126.
laevis (Ocypoda) 35, 36.
laevis (Pachygrapsus) 76.
laevis (Paragrapsus) 125, 126.
lafondi (Sesarma (Sesarma)) 113.
lagostomus (Gecarcinus) 138.
lalandei (Gecarcoidea) 138.
laniger (Pseudograpsus) 98, **99**, 100, 101, 102, 103.
latifemur (Sesarma) 111, 112.
*latifrons (Grapsus)* 81.
latifrons (Metopograpsus) 79, **81**.
*latreilli (Cyclograpsus)* 120.
latreilli (Helice) 118, 120, 121, 122, 123, 124.
latreillei (Macrophthalmus) 59.

latreillei (Uca) 40.
*lavauxi (Cyclograpsus)* 126.
*leachi (Cleistostoma)* 61.
leachi (Helice) 118, 119, **120**, 122, 123, 124.
*leachi (Hymenosoma)* 9.
*leachi (Liriopea)* 9.
leachi (Paracleistostoma) 63.
Leiolophus 127, 129, 130.
lenzii (Sesarma (Chiromantes)) 114.
leptognathus (Eriocheir) 107.
Leptograpsus 70.
*Limnocarcinus* 138.
lineata (Elamenopsis) 26.
*lineatus (Elamenopsis)* 26.
lingulatum (Cleistostoma) 61, 62.
*linnaeana (Planes)* 83.
*Liolophus* 129.
*Liriopea* 9.
litterata (Varuna) 84, 85.
livida (Sesarma (Chiromantes)) 114.
lividus (Geograpsus — stormi) 74, **75**.
longicarpus (Mictyris) 41, **42**.
longirostris (Elamena) 20, **24**.
longirostris (Trigonoplax unguiformis —) 25.
longipes (Cyclograpsus) 126.
longipes (Discoplax) 137.
*longipes (Grapsus)* 71.
longipes (Metaplax) 116.
*longipes (Pachygrapsus)* 77, 78.
longitarsis (Brachynotus) 104.
longitarsis (Grapsus strigosus —) 72, 73, 74.
*longitarsis (Heterograpsus)* 104.
lophopus (Cyclograpsus) 126.
*lucasi (Helice)* 118.
*lucasi (Heterograpsus)* 102.
*lucasi (Liriopea)* 9.

Macrophthalminae 34, **57**, 68.
Macrophthalmus 41, 43, 57, **58**, 61, 104, 115.
maculatus (Grapsus) 71, 72.
maculatus (Grapsus — gracilipes) 72.
maculatus (Grapsus — tenuicristatus) 72.
*maculatus (Heterograpsus)* 105.
maculatus (Metopograpsus) 79, **80**, 81.
malabarica (Dotilla) 44.
manii (Uca) 38.
marinus (Planes) 83.
marionis (Uca) 37, **38**, 39.
marionis (Uca — cultrimana) 38, 39.
marionis (Uca — excisa) 38, 39.
*marmoratus (Heterograpsus)* 105.
marmoratus (Hymenicus) 12, **17**.
mathaei (Elamena) 21.
*mathaei (Elamene)* 21.
*mathaei (Hymenosoma)* 21.
mearnsi (Uca) 37.
messor (Metopograpsus) **79**, 80, 82.
messor (Metopograpsus — frontalis) 79.
messor (Metopograpsus — gracilipes) 79.
messor (Rhynchoplax) 18.
*Metagrapsus* 115.
Metaplax 104, 108, **115**, 116, 117, 118.
Metasesarma 107, 108, **109**.
Metopograpsus 70, 75, **78**.
*mexicana (Elamene)* 19.
Mictyrinae 34, **40**, 68.
Mictyris 40, **41**, 42.
minikoiensis (Geograpsus) 74.
minuta (Elamena) 19, **21**.
minutus (Pachygrapsus) 75, 77.
minutus (Planes) 83.
modesta (Sesarma (Sesarma)) 113.
*Myctiris* 41.
myctiroides (Dotilla) 43.

nausithoe (Utica) 96.
*Nectograpsus* 132, 133.
*nitidus (Gelasimus)* 38.
nobilii (Ocypoda) 35.
notatus (Epigrapsus) 133, 134.
*notatus (Grapsodes)* 134.
*notopus (Archaeoplax)* 29.
*notopus (Ptenoplax)* 33.
notopus (Retropluma) 29, 31, 32, 33.
novae-guineae (Uca) 37, 38.
novae-zealandiae (Hymenicus) 12, **16**.
nudus (Brachynotus) 105.
*nudus (Heterograpsus)* 105.
*nudus (Pseudograpsus)* 105.

*obesum (Cardisoma)* 137.
occidentalis (Cyclograpsus) 127.
*oceanicus (Grapsus)* 81.
oceanicus (Metopograpsus) 79, 80, **81**, 82.
octodentatus (Brachynotus) 106.
*octodentatus (Cyclograpsus)* 106.
*octodentatus (Heterograpsus)* 106.
Ocypoda 34, **35**, 46, 68, 133, 136
Ocypodidae **34**, 115.
Ocypodinae **34**, 68.
onyx (Ptychognathus) 86.
orbiculare (Hymenosoma) 5.
oregonensis (Brachynotus) 104.
*oregonensis (Heterograpsus)* 104.
*oregonensis (Pseudograpsus)* 104.
*orientale (Chaenostoma)* 60.
*orientalis (Dioxippe)* 49.
orientalis (Tympanomerus) 49.
orientalis (Uca annulipes —) 37.
ovatus (Halicarcinus) 9, **11**.

Pachygrapsus 70, **75**, 78, 79.
*Pachystomum* 99.
palawanensis (Sesarma (Sesarma)) 113.
pallipes (Brachynotus) 104.
*pallipes (Heterograpsus)* 104.
*pallipes (Pseudograpsus)* 104.
paludicola (Camptandrium) 68.
Paracleistostoma 58, 61, **62**, 68, 69.
Paragrapsus 108, 117, 118, 121, **125**.
*parallelus (Grapsus)* 80.
parvula (Acmaeopleura) 83, **106**.
parvulus (Cyclograpsus) 127.
parvulus (Cyclograpsus — unidens) 127.
*Pelocarcinus* 137.
penicillatus (Brachynotus) 104.
*penicillatus (Brachynotus (Heterograpsus))* 104.
*penicillatus (Grapsus (Eriocheir))* 104.
*penicillatus (Heterograpsus))* 104.
Percnon 127, **129**, 130.
Perigrapsus 84.
*Perisesarma* 109.
*philippinense (Pachystomum)* 99.
philippinensis (Tympanomerus) 49.
*pictus (Metopograpsus)* 81.
*pilimana (Helice)* 118, 120, 123, 124.
pilimanum (Percnon) 130.
*pilimanus (Acanthopus)* 130.
*pilimanus (Leiolophus)* 130.
*pilimanus (Percnon)* 130.
*pilipes (Gnathograpsus)* 88.
pilipes (Ptychognathus) 88.
pilosa (Elamena) 20, **21**.
*pilosa (Elamene)* 21.
pilosus (Ptychognathus riedelii —) 92.
Plagusia 128.
Plagusiinae 70, **127**.
planatus (Halicarcinus) 9, **10**, 19, 21.
Planes 70, **83**.
planifrons (Pachygrapsus) 76, 77, 78.
*planissima (Plagusia)* 130.
planissimum (Percnon) 128, **130**, 131.
*planissimus (Leiolophus)* 131.
*planissimus (Liolophus)* 131.
platycheles (Mictyris) 42.
*Platygrapsus* 84.
*Platynotus* 84.
*plicatus (Goniograpsus)* 77.
*plicatus (Grapsus)* 77.
plicatus (Pachygrapsus) 76, 77, 78.
plumosa (Retropluma) 30.
politus (Epigrapsus) **133**, 135.
polleni (Ptychognathus) 87.
producta (Elamena) 20, **24**.
profuga (Dotilla) 44.
propinquus (Pachygrapsus) 76, 78.
Pseudograpsus 84, **97**, 102, 103.
*Ptenoplacidae* 29.
*Ptenoplax* 29, 33.
Ptychognathus 83, **85**, 94, 95, 97.
pubescens (Halicarcinus) 9.
pubescens (Hymenicus) **12**, 19.
punctatum (Sarmatium) 115.
punctatus (Cyclograpsus) 126.
*pusilla (Cleistostoma)* 49.
*pusilla (Ocypode (Cleistostoma))* 49.
*pusilla (Ptychognathus)* 87, 93.
pusillus (Ptychognathus) 87, **93**, 94, 99.
pusillus (Tympanomerus) **49**, 50, 51.
Pyxidognathus 83, 95.

*quadridentatus (Chasmagnathus)* 125.
*quadridentatus (Cyclograpsus)* 125.
quadridentatus (Metopograpsus) 79, 82.
quadridentatus (Paragrapsus) 125.
quoyi (Elamena) 12.
*quoyi (Elamene)* 12, 13, 19.

*rathbunae (Uca)* 37, **38**.
rectus (Eriocheir) 107.
*rectus (Eriochirus)* 107.
Retropluma **29**, 33.
Retroplumidae 29.
*reynaudi (Cyclograpsus)* 126.
*Rhaconotus* 115.
Rhynchoplax 5, 11, **17**.
*riedelii (Gnathograpsus)* 92.
riedelii (Ptychognathus) 87, **92**.
riedelii (Ptychognathus — pilosus) 92.
rostrata (Rhynchoplax) 17, **18**.
*rostratum (Hymenosoma)* 18.
rotunda (Acmaeopleura) 83, **106**.
*rotunda (Thelphusa)* 137.
rotundata (Ocypoda — arabica) 35.
rotundata (Sesarma (Sesarma)) 113.
*rotundum (Cardisoma)* 137.
rousseauxi (Metasesarma) 109.

sandakani (Macrophthalmus) 58.
sanguineus (Brachynotus) 103, **105**.
*sanguineus (Grapsus (Grapsus))* 105.
*sanguineus (Hemigrapsus)* 105.
*sanguineus (Heterograpsus)* 105.
Sarmatium 107, 108, 109, **115**.
Scopimera 41, 43, **45**.
Scopimerinae 40.
Sesarma 107, 108, **109**, 110, 125, 132.
Sesarma (Chiromantes) 109.
Sesarma (Holometopus) 109.
Sesarma (Parasesarma) 109.
Sesarma (Sesarma) 109.

Sesarminae 70, **107**, 115, 122.
setirostris (Rhynchoplax) 18.
setosipes (Utica) 96.
setosus (Pseudograpsus) 97, 98, 100.
sexdentatum (Camptandrium) 65.
sexdentatus (Brachynotus) 103, 104.
*sexdentatus (Cyclograpsus)* 105.
*sexdentatus (Gonoplax)* 102, 105.
*sexdentatus (Hemigrapsus)* 105.
*sexdentatus (Heterograpsus)* 102, 103, 105.
sigillorum (Dotilla) 43.
sindensis (Elamena) 20, **24**.
sindensis (Uca inversa —) 37.
sinensis (Eriocheir) 107.
*sinensis (Eriochirus)* 107.
socialis (Baruna) 84.
speciosa (Plagusia) 129.
spinicarpa (Helice) 118, 119.
spinicarpus (Ptychognathus) 86, 90, 91.
spinosus (Brachynotus) 106.
*spinosus (Heterograpsus)* 106.
*squamosa (Plagusia)* 129.
stapletoni (Tympanomerus) **49**, 56.
stimpsoni (Ocypoda) 35.
stormi (Geograpsus lividus —) 74, **75**.
*striatus (Pachygrapsus)* 77.
strigosus (Grapsus) **71**, 72, 73, 74, 131.
strigosus (Grapsus — longitarsis) 72, 73.
subquadrata (Helice) 118, 119, **120**, 121, 122, 123.
*subquadratus (Chasmagnathus)* 118, 119, 120, 122, 123.
*subquadratus (Grapsus)* 72.
sulcata (Dotilla) 43, **44**.

taeniolata (Sesarma) 112.
tectum (Clistocoeloma) 115.
telescopicus (Macrophthalmus) 58.
tenuicrustatus (Grapsus maculatus —) 72.
*tenuifrons (Acanthopus)* 130.
tetragonon (Uca) 39.
tetratylophorus (Tylodiplax) 69.
Thelphusa 137.
*thukuhar (Grapsus)* 80.
thukuhar (Metopograpsus) 79, **80**, 82.
*thukuhar (Metopograpsus messor —)* 80.
*thukujar (Goniograpsus)* 80.
*Tmethypocoelis* 51.
*tomentosa (Plagusia)* 129.
tomentosa (Varuna) 84.
transversus (Pachygrapsus) **76**, 82.
triangularis (Uca) 40.
*Trichopus* 84.
tridens (Helice) 118, 119, 122, 123, 124.
*tridens (Ocypode (Helice))* 119.
tridentata (Euplax) 59, 60.
*tridentatum (Cleistostoma)* 59, 61.
*tridentatum (Hymenosoma)* 9.
*tridentatus (Halicarcinus)* 9, 13.
Trigonoplax 4, 23, **25**.
truncata (Elamena) 20, **22**.
*truncata (Elamene)* 22.
*truncata (Trigonoplax)* 22.
tuberculata (Plagusia depressa —) 128, 129.
*tuberculata (Scopimera)* 46, 47.
Tylodiplax 58, **69**.
Tympanomerus 41, **48**, 57.

Uca 34, **37**, 42, 43, 46, 67, 132.
*unguiformis (Elamena)* 25.
*unguiformis (Elamene)* 25.
*unguiformis (Elamena (Trigonoplax))* **25**, 26.
*unguiformis (Inachus (Elamene))* 3.
*unguiformis (Ocypode (Elamene))* 3, 25.
unguiformis (Trigonoplax) 25.
unguiformis (Trigonoplax — longirostris) 25, **26**.
unidens (Cyclograpsus parvulus —) 127.
urvillei (Paragrapsus) 118, 125.
urvillei (Uca) 38, 132.
Utica 84, **95**.

variegatus (Leptograpsus) 70.
*varium (Hymenosoma)* 16.
varius (Hymenicus) 12, **16**, 17.
Varuna 70, 83, **84**, 85, 128.
Varuninae 70, **82**.
*verreauxi (Paragrapsus)* 125, 126.
villosa (Sesarma (Holometopus)) 112.
*vocans (Uca)* 37, 39.
*vocans (Gelasimus)* 39.

*whitei (Cyclograpsus)* 126.
whitei (Elamena) 13, 20, **24**, 25.
*whitei (Elamene)* 25.
wichmanni (Dotilla) 45.
*wood-masoni (Hymenicus)* 18.
wood-masoni (Rhynchoplax) 18.

zamboangana (Uca) 37.

# EXPLANATION OF PLATES.

# PLATE I.

Fig. 1. *Hymenosoma orbiculare* Desmarest, ♂, magn. 2.

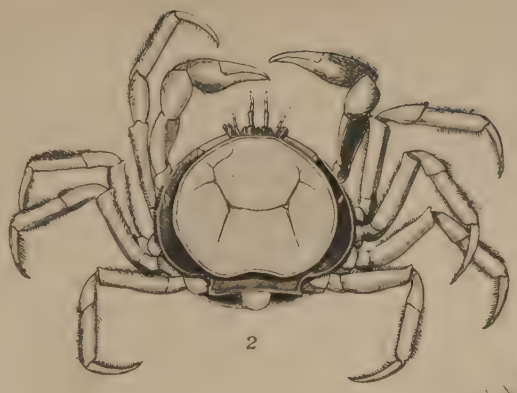
Fig. 2. *Halicarcinus planatus* (Fabricius), ♂, magn. 2. Fig. 2*a*, dactylus of last pair of walking legs, magn. 10.

Fig. 3. *Hymenicus edwardsi* Filhol. ♂, magn. 3. Fig. 3*a* anterior part of carapace, magn. 10. Fig. 3*b* external maxilliped, magn. 10. Fig. 3*c* abdomen, magn. 10.

Fig. 4. *Elamena truncata* (Stimpson), ♂, magn. 3. Fig. 4*a* ventral view of anterior part of carapace, magn. 10. Fig. 4*b*. ♀, magn. 3. Fig. 4*c* dactylus of last pair of walking legs of the ♀, magn. 10.

Fig. 5. *Elamenopsis lineata* A. Milne-Edwards, ♂, magn. 7. Fig. 5*a* chela, outer view, magn. 15. Fig. 5*b* external maxilliped, magn. 25. Fig. 5*c* abdomen, magn. 15.

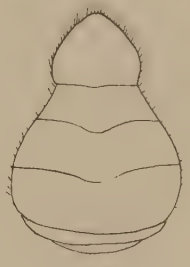
1


2

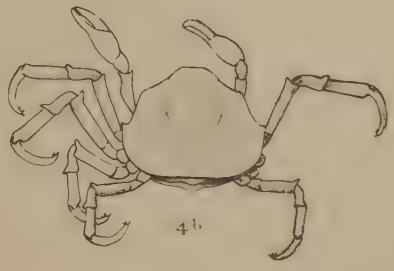
2^a

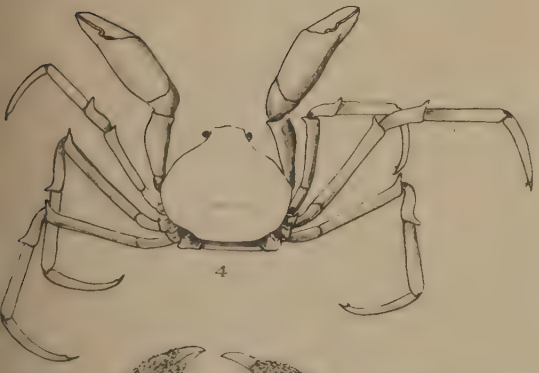
3^a

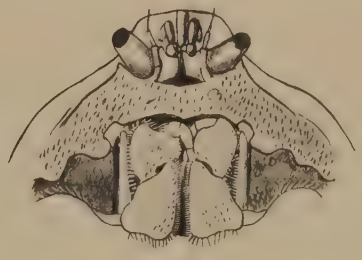
3


3^c

3^b


4^b


4


4^a

4^c

5

5^a

5^c

5^b

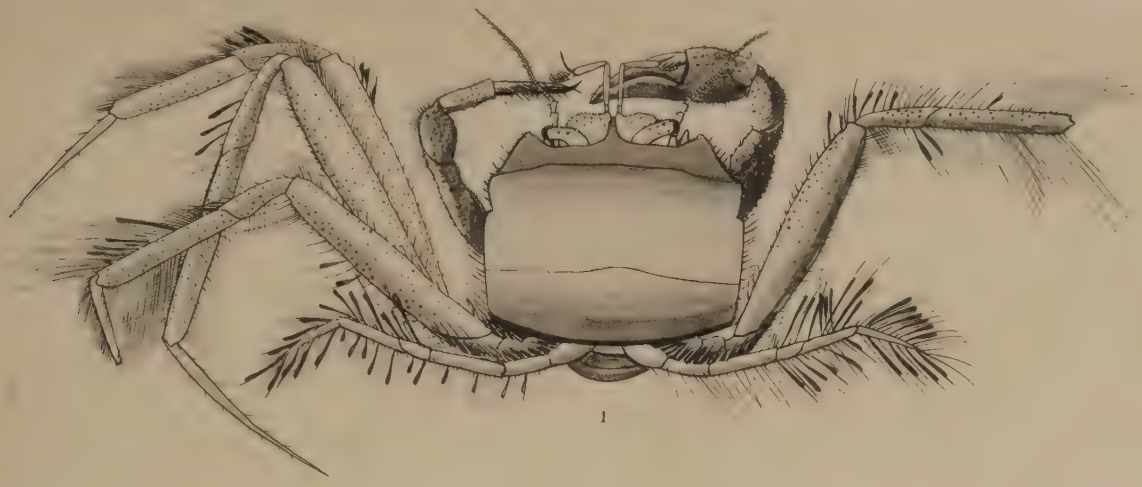
Tesch, del.

1. Hymenosoma orbiculare Desmarest.
2. Halicarcinus planatus (Fabricius)
3. Hymenicus edwardsi Filhol.
4. Elamena truncata (Stimpson).
5. Elamenopsis lineata A. Milne-Edwards.

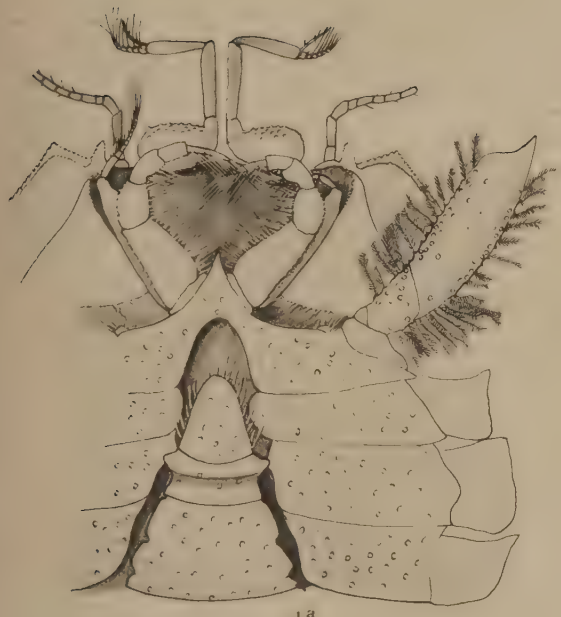
# PLATE II.

Fig. 1. *Retropluma plumosa* n. sp., ♂, magn. 5. Fig. 1*a* ventral view of carapace, magn. 10. Fig. 1*b* larger chela, outer view, magn. 10. Fig. 1*c* smaller chela, outer view, magn. 10.

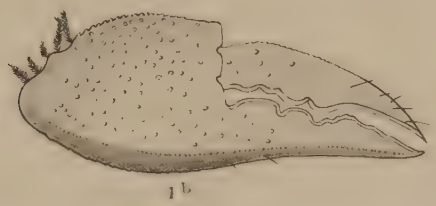
Fig. 2. *Tympanomerus ceratophorus* (Koelbel), ♂, magn. 7. Fig. 2*a* external orbital angle and epibranchial tooth, magn. 20. Fig. 2*b* external maxilliped, magn. 15. Fig. 2*c* abdomen, magn. 10.



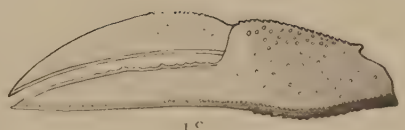
1



1a



1b



1c

2

2c

2b

J. Tesch, del.

HELIOTYPIE J.VAN LEER & Co.

1. Retropluma plumosa n.sp.

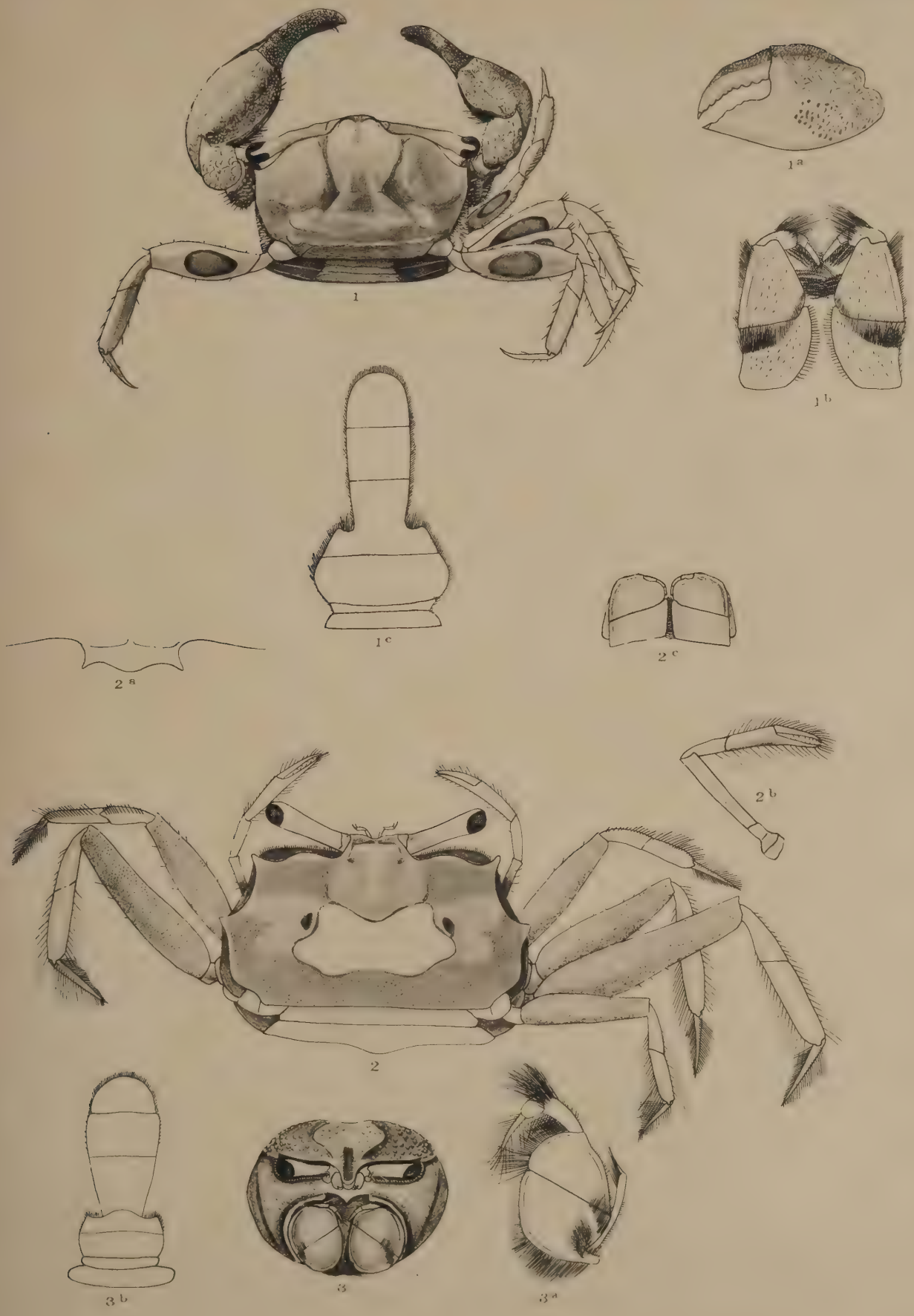
2. Tympanomerus ceratophorus (Koelbel).

# PLATE III.

Fig. 1. *Tympanomerus integer* n. sp., ♂, magn. 7. Fig. 1*a* chela, outer view, magn. 7. Fig. 1*b* external maxillipeds, magn. 15. Fig. 1*c* abdomen, magn. 10.

Fig. 2. *Paracleistostoma dentatum* n. sp., ♀, magn. 10. Fig. 2*a* front, anterior view, magn. 20. Fig. 2*b* chela, magn. 10. Fig. 2*c* external maxillipeds, magn. 10.

Fig. 3. *Scopimera globosa* de Haan, cephalothorax in front view, magn. 4. Fig. 3*a* external maxilliped, magn, 7. Fig. 3*b* abdomen of ♂, magn. 5.

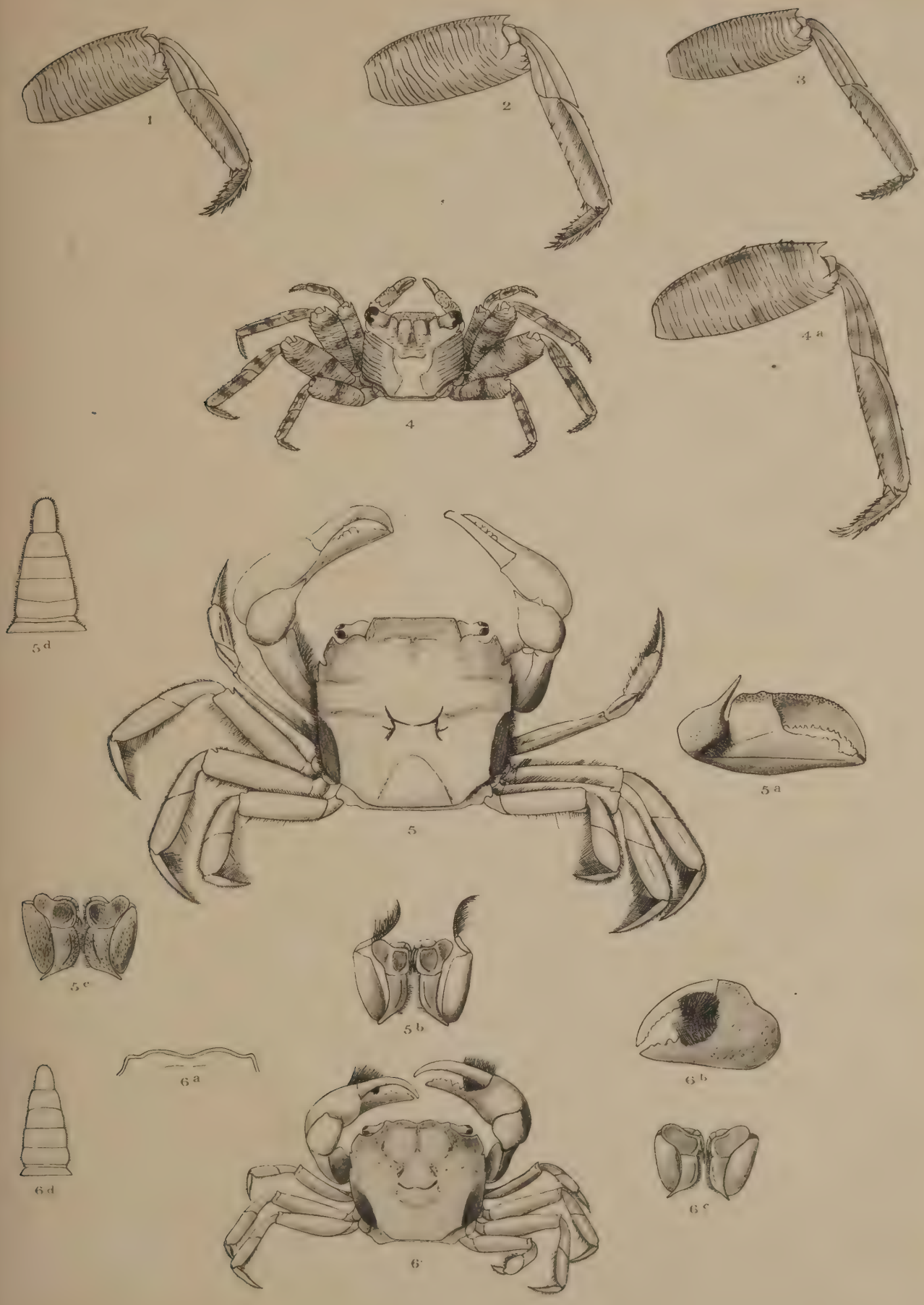



J. Tesch, del.

1. Tympanomerus integer n.sp.
2. Paracleistostoma dentatum n.sp.
3. Scopimera globosa de Haan.

# PLATE IV.

Fig. 1. *Grapsus strigosus* Herbst, penultimate leg (breadth of carapace 45.5 mm.), natural size.
Fig. 2. *Grapsus maculatus* Catesby, penultimate leg (breadth of carapace 46 mm.), natural size.
Fig. 3. *Grapsus maculatus gracilipes* H. Milne-Edwards, penultimate leg (breadth of carapace 37 mm.), nat. size.
Fig. 4. *Grapsus strigosus longitarsis* Dana, young ♂, magn. $2^1/_4$. Fig. 4*a* penultimate leg, magn. 5.
Fig. 5. *Ptychognathus altimanus* (Rathbun), ♂, magn. 2. Fig. 5*a* chela, outer view, magn. 2. Fig. 5*b* external maxillipeds of ♂, magn. 2. Fig. 5*c* external maxillipeds of ♀, magn. 3. Fig. 5*d* abdomen of ♂, magn. 2.
Fig. 6. *Ptychognathus guijulugani* Rathbun, ♂, magn. $2^1/_2$. Fig. 6*a* front, dorsal view, magn. 5. Fig. 6*b* chela, outer view, magn. 3. Fig. 6*c* external maxillipeds, magn. 3. Fig. 6*d* abdomen, magn. 3.




J. Tesch, del.

HELIOTYPIE L.VAN LEER & C.^IE AMSTERDAM

1. Grapsus strigosus Herbst. penult. leg.
2. Grapsus maculatus Catesby. penult. leg.
4. Grapsus strigosus longitarsis Dana.
5. Ptychognathus altimanus (Rathbun).

# PLATE V.

Fig. 1. *Pseudograpsus laniger* n. sp., ♂, magn. 4. Fig. 1*a* ventral view of carapace, magn. $4^1/_2$. Fig. 1*b* chela, outer view, magn. 7. Fig. 1*c* chela, inner view, magn. 7. Fig. 1*d* abdomen, magn. 5.

Fig. 2. *Sesarma* (*Holometopus*) *elongata* A. Milne-Edwards, ♀, magn. $1^1/_2$.

Fig. 3. *Camptandrium sexdentatum* Stimpson, ♂, magn. 3. Fig. 3*a* ventral view of carapace, magn. 5. Fig. 3*b* cheliped, outer view, magn. 5. Fig. 3*c* abdomen, magn. 5.

J. Tesch, del.

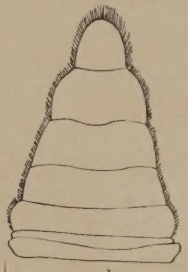
1. Pseudograpsus laniger n. sp.
2. Sesarma (Holometopus) elongata A. Milne-Edwards
3. Camptandrium sexdentatum Stimpson

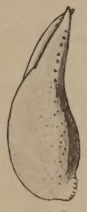
# PLATE VI.

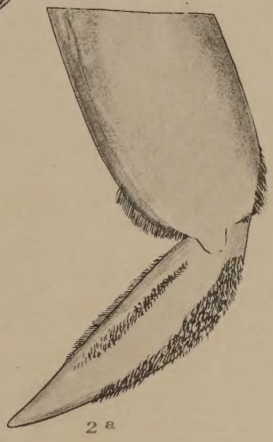
Fig. 1. *Helice subquadrata* (Dana), ♂, magn. 3. Fig. 1*a* propodite and dactylus of posterior legs, magn. 10. Fig. 1*b* chela, outer view, magn. 3. Fig. 1*c* chela, ventral view, magn. 3. Fig. 1*d* abdomen, magn. 3.

Fig. 2. *Paragrapsus laevis* (Dana), propodite and dactylus of posterior legs, magn. 10. Fig. 2*b* abdomen, magn. 3.

Fig. 3. *Epigrapsus* (= *Grapsodes*) *notatus* Heller, ♀, magn. 2.



J. Tesch, del.

HELIOTYPIE, L.VAN LEER & Cº AMSTERDAM

1. Helice subquadrata (Dana).
2. Paragrapsus laevis (Dana).
3. Epigrapsus (= Grapsodes) notatus Heller.